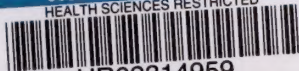


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FOURTH ANNUAL PROCEEDINGS
OF THE
ASSOCIATION MILITARY SURGEONS
OF THE
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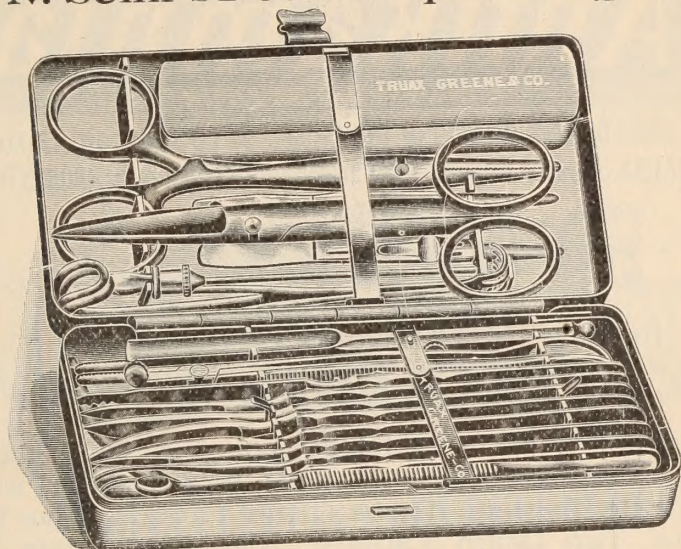
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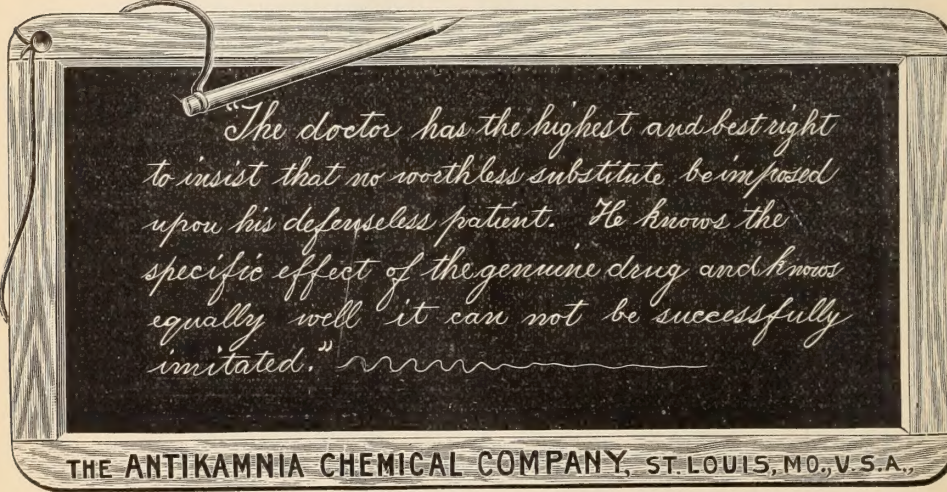


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THE PROCEEDINGS
OF THE
FOURTH ANNUAL MEETING
OF THE
ASSOCIATION OF MILITARY SURGEONS
OF THE
UNITED STATES.

HELD AT WASHINGTON, D. C.,

ON THE

1ST, 2D AND 3D OF MAY, 1894.

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The Third Annual Meeting was held at Chicago, Ill., at Rush Medical College, on August 8th, and at United States Government Building, Jackson Park (World's Columbian Exposition), August 9th and 10th, 1893.

OFFICERS OF THE ASSOCIATION OF
Military Surgeons of the National Guard
OF THE UNITED STATES,
FROM THE FIRST ORGANIZATION.

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First Annual Meeting was held at Chicago, Ill., on the 17th and 18th of September, 1891.

For 1892-1893.

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The Second Annual Meeting was held at St. Louis, Mo., on the 19th, 20th and 21st of April, 1892.

THE PROCEEDINGS
OF THE
FOURTH ANNUAL MEETING
OF THE
Association of Military Surgeons
OF THE UNITED STATES,
HELD AT
WASHINGTON, D. C.,
On the 1st, 2d and 3d of May, 1894.
FRIDAY MORNING SESSION.

PROGRAMME.

NATIONAL THEATRE, E STREET,

Between 13th and 14th, N. W.

PRAYER by the Rev. T. S. HAMLIN, D. D., Church of the Covenant.

OPENING OF THE CONGRESS by the President of the United States.

MUSIC.

ADDRESS OF WELCOME on behalf of the Citizens of the District of Columbia, by
Hon. JOHN W. ROSS, Commissioner.

ADDRESS OF WELCOME on behalf of the Medical Society of the District of
Columbia, by Prof. SAMUEL C. BUSEY, M. D., LL. D., President of the
District Medical Society.

MUSIC.

ADDRESS OF WELCOME on behalf of the National Guard of the District of
Columbia, by Brigadier-General ALBERT ORDWAY, Commanding National
Guard, District of Columbia.

PRESIDENT'S ANNUAL ADDRESS—" *Abdominal Surgery on the Battlefield*,"—by
Colonel N. SENN, Surgeon-General N. G. Illinois, President of the
Association.

The Association convened in Annual Session at the
National Theatre at ten o'clock Tuesday morning, and was
called to order by Major Geo. Henderson, Chairman of the
Committee of Arrangements, who said:—

Ladies and Gentlemen:—The time having arrived to open the Fourth Annual Meeting of the Association of Military Surgeons of the United States, the house will please come to order. You will listen to an invocation of the divine blessing by the Rev. Dr. Hamlin, of Washington City.

At the close of the prayer, Major Henderson said: "Members of the Association of Military Surgeons of the United States here assembled, it is our distinguished honor, that I present to you this morning, President Cleveland, the Commander-in-Chief of the Armies of the United States." Then, advancing with him to the speaker's stand, he was introduced to the assemblage. The audience saluted him by rising, after which the President spoke as follows:

Gentlemen:—I have taken a few minutes from the weight of engrossing duties to give evidence of my appreciation of the purposes and aims of this Association.

Ever since I was Governor of New York I have become somewhat responsible for the welfare of the National Guard of the Empire State. I have taken an interest in all that pertains to the National Guard of the land, as it is that on which the government must rely whenever that time shall come. The National Guard of all the States should have a community of interest and effort. One of the most useful objects of the world is the study of health and sanitation.

The National Guard and the Federal Army should co-operate. Every patriotic American citizen should applaud your efforts in the direction of mercy. With a hearty wish for the welfare of this Association, it only remains for me to declare this meeting open for the transaction of business.

Major Henderson next introduced the Honorable John W. Ross, President of the Board of Commissioners, who delivered an address of welcome to the Capital of our Nation on the part of the Citizens of the District of Columbia, as follows:

Ladies and Gentlemen:—It is an appreciated honor to represent the District of Columbia in extending the welcome of its people to this representative body of American citizens who compose the association known as the Military Surgeons of the United States. Many of our members have long been identified with some of the most important interests of the District of Columbia. Some of them have been most active and influential in the furtherance of ways and means to guard and foster the sanitary interests of the national capital. When there was a threatened invasion of cholera from the old world within the past two years, they co-operated most ably and efficiently with the members of the local profession and with the officials of the District of Columbia to protect our people from the dangers which then seemed near at hand.

By your association you have recognized the benefits to be derived from organization; the advantages to be had from an annual comparison of professional observations, and the pleasures attendant upon social reunions, among those charged with like responsibilities, having the same hopes of honorable preferment and the same ambition to serve loyally and well the government established by the fathers of the republic. You have well and wisely chosen the capital of your country as your place of meeting. May I refer briefly to the relations which exist between that capital and the people of the United States? The place where the people's representatives formulate into law the people's will in the only mode prescribed by the Constitution or known to our system of government; the place where the people's great chief magistrate resides and executes the laws made by the people through their representatives in Congress; where the Supreme Court of the United States construes those laws. Certainly that place should at all times be free and open to the coming and going of all citizens of the republic, whether they be rich or poor, and whether they come by foot or by conveyance, so long as they observe and obey the laws which they themselves have made through and by their representatives in Congress.

Such a proposition needs only to be stated to receive the sanction of all right-thinking and sensible people. On the other hand, while citizens may peaceably and reasonably assemble at the capital, no

man who has comprehended our system of government needs to be convinced that any attempt to compel action on the part of any of the three great co-ordinate branches of the government by menace or threat, or show of physical force, would be not only unlawful, would not only substitute the rule of the mob for the rule of the people, but would constitute an insult to the people of the United States, whose agents should be so menaced or threatened. The right to come to Washington and to present petitions in an orderly and peaceable manner is unquestioned and unquestionable.

When that proves unavailing, if there be a wrong unrighted, then the remedy, according to the American plan, is to be had by the use of the ballot. That American plan of asserting and of enforcing the people's will has served its intended purpose for more than a hundred years of such civil and religious liberty and of such general prosperity among the wage-earners of the land as has been accorded to no other people since history began.

That as a result of a great financial depression there is a want of employment and consequent suffering cannot be denied. The same sad condition seems to prevail throughout the civilized world. But if there be any present remedy, it certainly is not to be had by mob violence, by disregard of the rights of property, or by other violations of law.

If the remedy lies in legislation by Congress, the people who elect their representatives can give instructions at any time to their members from each Congressional district, and to their Senators from each State at large, and if the instructions be not obeyed, the remedy is plain under our system of government.

I crave your pardon for stating these self-evident truths in an address of welcome to citizens who have always shown by word and act their devotion to the principles on which the government was founded. Recent acts of lawlessness on the part of some misguided men, who claim rights never before asserted in this country as the proper means of compelling Congressional action, have induced this reference to some contemplated visits to the capital.

I do not intend that such a reference to pending conditions shall in any way impair or detract from the sincerity or the hearti-

ness of our welcome to this honored Association. The people of the District are proverbially hospitable and generous. They invite their fellow citizens of all of the fraternities and of all of the associations to regard this as their convention city. They have an especial pride in entertaining these members of a profession honored throughout the world, and they know and feel assured that the members of the local profession will maintain the high standard of hospitality which has always characterized it.

Whenever you go within the limits of the District you will meet with objects of national and historical interest. When you view the noble memorial built in honor of the exalted character and broad patriotism of him for whom our beloved city is itself a monument; when you follow the course of the great river to his last resting place, may you have a renewed admiration for the wisdom which guided Washington and his great compatriots in founding a system of government so well adapted to the protection of all rights and to the righting of all wrongs. And when your deliberations shall have ended, you may return to your homes with a greater love for your country, and a higher resolve to protect and maintain in its entirety the heritage left to us by the great men who founded the republic.

Major Henderson then introduced the venerable Dr. Samuel C. Buscy, President of the Medical Society of the District of Columbia, and an honored member of the local profession, who gave earnest words of welcome on the part of his society:

Mr. President and Gentlemen:—I am here as the representative of the Medical Society of the District of Columbia, to extend to you the right hand of fraternal friendship and comity of a society which is one of twelve medical societies in this country that have passed the age of seventy-five years in active and continuous existence; and to bid you welcome to the city of its birth, in which it has lived these many years, contemporaneous in history, progress and power with the growth, development and prosperity of this metropolis, and now, as heretofore, commanding the respect and

confidence of the community. Its beginning was inspired by that spirit of beneficence, which bound its founders together in one compact body of such and only such physicians as were qualified to practice the healing art and to promote and disseminate medical and surgical knowledge, that the people might be protected from the wrongs and injuries inflicted by charlatans and pretenders. Throughout its long life it has accepted, maintained and followed the maxium of the Republic—"Union, now and forever, one and inseparable,"—as alike applicable to the advancement of scientific medicine and to maintenance of the union of these States. With firm, steadfast and unwavering devotion to the highest aims of medical science, it has successfully passed through many vicissitudes of political agitation, bid defiance to assaults from without, and outlived schisms in its own membership.

It passed through the period of internecine strife, and emerged from that conflict of havoc, bloodshed and waste of treasure increased in number and power, and stands here to-day to bid welcome to this organization, which is the outgrowth of that development, and the first to unite in organized and cohesive effort to utilize, promote, advance and perfect the science of military medicine and surgery. And let it be said here and now, that if those armies could have been equipped with such men and appliances as they could be to-day, the missiles of warfare would have found many thousands less of victims and untold millions of treasures would have been saved. The war gave impetus to new thought, to new and broader conceptions of military duty; and the achievements of modern American surgery owe their inception to the opportunities and lessons which you and others have expanded and applied in the interest of a common humanity. And, now, this country holds the sceptre of surgery.

In 1858 the lamented Harvey Lindsley, in his address of welcome to the American Medical Association, then assembled in this city, after giving expression to his regret and mortification that the city was so barren of all that would interest the votaries of medical science and attract the pleasure-seeker and tourist, added, in language that reads like the inspiration of prophecy:—"The

day is not far distant, when by the liberality of a great people, our public buildings, our literary and scientific institutions, our national parks, and botanic gardens, will be worthy of the grand metropolis of a nation, which, perhaps, within the next half century will be the most populous, powerful and wealthy in Christendom." I heard those words thirty-six years ago, and I stand here to-day, representing the same organization, to bid you welcome to the Capital in which every prediction has been realized. And yet it has but reached the stage of growth and development, which is but the promise of what it is to be in the future, when, as the Nation's Capital, reflecting its power, glory and wealth, it will surpass in all that pertains to art, literature, science, civilization, and human comforts and luxuries, the most favored metropolis of the civilized world.

That you may better appreciate the modesty of Lindsley's description and the fullness of his prophecy, let me tell you that when I came here, some years earlier, there were but two streets partly paved, but few sidewalks paved beyond the center of the city—these being, for the most part, improved by midway ridges of gravel and coal ashes;—but there were long stretches of zig-zag paths along which pedestrians could walk only in single file. There were no telephones, street tramways, nor cable and trolley systems of rapid transit to fill the wards of an emergency hospital and encourage the incidental sciences of embalming and undertaking. Street transportation was limited to a few hotel omnibuses, through line coaches, a few hackney carriages, a corps of night liners, as now, and Shank's mare. From the Capitol to Georgetown several antiquated busses ran at irregular intervals along Pennsylvania avenue. The fare for a ride each way for each passenger was one eleven-penny bit, but a colored nurse could not get a ride at any price, unless she had somebody's white baby in her lap. The back yards of many private dwellings were decorated with pig-styes, cow-sheds and pens for the gangs of unyoked geese. During the day the animals and fowls roamed at will, singly or in herds or flocks, through the streets and over the fields, in lordly insolence. Garbage was thrown into the carriage-ways or back alleys, and

swine were the privileged and protected scavengers. To jostle against or drive over one of these municipal functionaries when out on his tour of sanitary inspection, incurred a cash penalty or brief servitude in the work-house. The swine nuisance dominated the city authorities until a gentleman was knocked down and killed by one running between his legs, and the family milch cows were finally driven to the shambles by the more economical and adulterated milk supplies from the dairy farms of Maryland and Virginia. The goose industry bid defiance to every protest until the robber bands learned the flavor of their flesh. During that early period I have trudged on foot through sunshine and shower along the well-beaten paths for short cuts across the fields and through the slashes, in search of some lonely hut situated over yonder, behind or near by some other equally undefined locality; here and there along the way driving a drove of swine from their mire, or hustling away from the corporation bulls; or during the night along streets, alleys and by-ways so dark with blackness that eyes were most useful when closed, or dimly lighted with lard-oil lamps, so remotely separated that they seemed like *ignes fatui* enticing one into the dismal realms of hobgoblins and ghosts; or perchance—in some localities now traversed by well paved streets and avenues, adorned on either side with palatial residences,—along the pathways only trodden by the beasts of the field.

Then the war came, and with it a transformation not less surprising than the primitive methods and conditions to which I have referred. The barren farm and pasture lands were occupied with encampments, fortifications, parade-grounds, hospitals, wagon-yards, mule-pens, and other munitions of warfare. The streets were in continuous martial array, with troops equipped for the field. In brief, the city was one great impregnable fortress, protecting a government that never for one moment faltered in courage or paused in prosecution. With these stupendous preparations and masses of troops there came the *omnium gatherum* of contrabands, refugees, scalawags, camp followers, tramps, substitute brokers, wild-cat money changers, fiat-money people, office-seekers as now; and, last but not least, the croakers, who lived upon the immo-

cent credulity of timid women and the cowardice of malingerers, who wanted war, but somebody else to do the fighting. The croaker tarries with us yet, and continues, like "querulous frogs in muddy pools," to croak.

Nevertheless, those of you who saw the city then will mark the contrast now. Peace reigns where martial law dominated. Progress and development have marked every decade of the city's history since the close of the war. Now, go where you may please along these beautiful streets, these avenues of foliage trees, or out upon the hill-tops that environ the city, and the prospect and landscape will leave the memory of beauty in nature and excellence in art. The monument in honor of him whose name the city bears, rises from the lowlands high into space above, as the Nation's memorial of him who was "first in war, first in peace, and first in the hearts of his countrymen"; the Capitol, in which assemble annually the highest tribunals of legislation and justice, stands in beauty and perfection of architectural finish, above the rising and setting sun, in token of the supreme majesty of a united people; the new Library building approaching completion, with its gold-gilded dome reflecting and diffusing the rays of sunlight and sun life, in emblematic dissemination of the knowledge to be stored within its granite walls; the new Naval Observatory, far away from the busy mart and travel, towards the western limits of the city, is a fitting compliment to that branch of the service, which in the coming future will make the nation the master of the seas; and right here in the open park, near by, the historic mansion, with its walls hanging in portraiture of the men who have filled the highest office in the gift of a great and free people; and, then too, on the highlands beyond the Potomac, overlooking the city, is the bivouac of seventeen thousand dead, whose glory will never fade. All these, with many other commemorative memorials, are but the symbols of the Nation's pride, wealth, gratitude, prowess and majesty.

I cannot detain you with an enumeration of the charitable, educational and eleemosynary foundations which mark the progress since the development began, but must broadly state that in learned and scientific institutions, departments, bureaux and great national

libraries, with their corps of experts in every branch of science, this city offers opportunities unsurpassed in any city in this country. With three universities fully equipped and in successful operation, another with ten millions of people behind it, is preparing to garner the harvest waiting in ripeness for the sickle and the scythe.

And now, coming closer to that branch of science which most concerns you, I must remind you that the same spirit which has given impetus to new thought, and to new and enlarged conceptions of scientific research, has established in this city a medical library greater in number and value of volumes than any similar library in the world, and an anatomical and pathological museum unsurpassed in the variety of its collections. These foundations are outgrowths of the war. They have been developed at such trifling expense, and have contributed so much to the promotion and attainment of a higher standard of medical education, that one feels mean at the economy which seeks to limit their expansion.

In this connection let me say here and to you gentlemen, who are members of that profession whose mission will not be attained until the causes of disease are eradicated, and death is limited to the ailments to which flesh is necessarily heir and the processes of waste and decay, that the time has come when it should assert itself with all the vigor, force and power which a hundred thousand men united in a common cause can develop and exercise. There is not one family, nor one voter throughout this broad land, that some one of us cannot reach and tell the story of parsimony which denies to sanitary science, protective and preventive medicine, the opportunity to accomplish the full measure of philanthropy. Nay, even more, this great and munificent government educates its military officers, builds ships of war, adorns villages with costly public buildings, wastes millions on rivers and harbors, permits every quack, pretender, impostor and fraud to practice medicine, who may find dupes to gull, deceive, maim or kill; and seeks to strangle medical research by withholding the trifling pittance of a hundred journal subscriptions. With all this expenditure and waste of treasure, there is not a poor boy or woman in all the land who can acquire a first-class medical education, except by the sweat of his or her brow,

or the charity of some benevolent citizen. And yet there is not one man, in either the National or State legislatures, who, when sick and thinking the devil is at his door waiting for his departed spirit, will fail to cry for help, relief, and time to make his election sure.

In conclusion, I offer you the hospitality of our good will, and beg you to believe us to be your good friends.

Major Henderson and General Ordway then advanced to the speaker's stand, and the Major said: "Gentlemen of the Association, the Commander of the National Guard of the District of Columbia, on the part of his command, will give you expressions of our most cordial welcome to this, our Home, the most beautiful city on God's green earth.

Gentlemen:—I have been accorded the honor of attempting to welcome you to the hospitalities of the District of Columbia on behalf of the small but patriotic number of its citizens known as its National Guard. I am free to confess that if the honor had not been accorded to me, I would have applied for the privilege. The only thing that embarrasses me is representing them, and extending on their behalf our most cordial welcome, is that—although we are exceedingly patriotic citizens of the District, and our natural instincts most decidedly hospitable—we are under the control of a Congress of the representatives of the whole people of the United States, that exercise their economical theories on the District to such a degree that we are in a chronic impecunious condition, that prevents us from adequately, and in a practical way, showing our appreciation of your selection of our city for your convention.

The National Guard of the country, in contradistinction to its old-fashioned militia, dates its origin after the great riots of 1877. Fortunately its thorough organization and readiness for service has thus far prevented any domestic outbreaks or foreign attacks that would have needed your services. A few weeks since it appeared possible that the time of your meeting here was in happy coincidence with results that appeared possible from a demonstration against our domestic peace. From a military point of view all immediate apprehension has been averted, and we are in the happy position of

meeting all enemies of domestic peace in detail instead of in the aggregate; and there appears no possibility of gratifying your blood-letting proclivities, unless it may be in the harmless way of vaccination.

Speaking to you as military surgeons recalls to me the fact that you have not been able to practice your profession for about thirty years. This is the longest period in the history of our country that you have been without patients; and it is therefore not impossible to assume that your professional ambition may be satisfied before the end of the present generation. I am not sure that a little judicious blood-letting, if caused by foreign irritation instead of domestic, might not be a good thing for the American body politic, which appears to have gotten into such a plethoric condition that it is now somewhat inflamed.

Personally, I have a very great affection for military surgeons. In service I always found them the best providers, and having more "strikers" than any other officers. When, in the field, we had not the regulation amount of camp equipage, I invariably doubled up with the surgeon in preference to any other officer. At the end of a day's march I found that the men who were grateful to him for tender care, and the men who wanted a sick excuse from picket duty that night, invariably sought his camp-fire with a chicken or a mess of sweet potatoes as an honorarium or a bribe—and I conscientiously divided with him the fruits of his profession.

One thought has often occurred to me in regard to the military surgeon. In 1861 there was scarcely a surgeon that could be so designated. We made Quartermasters and Commissaries of business men, who upset all military traditions by the wonderful results they accomplished. We made officers and developed military genius from every grade of civilians. But beyond all, and towering far above these results, we quickly developed from all grades of the medical profession the most magnificent aggregation of military surgeons that the world has ever seen, and a Medical Department that has never been equaled, and I doubt if it will ever be surpassed. It is true that in the early days of the war, some of us thought you gained this great reputation and acquired this vast knowledge by a most

extended series of experiments in vivisection; but the few lives that you sacrificed in the early days of the war were more than compensated for by those you afterwards saved; and the grand result is stated and will forever be commemorated in that record of your work known as the Medical and Surgical History of the War of the Rebellion. No class of men in the world have ever had their deeds so commemorated, no class of men have ever reflected more credit on their country, than the military surgeons whose cases are recorded in that publication.

We extend all honor to you, and still with the hope that we may never need your services, we greet you with respect and bid you welcome to our city.

Major Henderson next introduced General Senn, in the following words:—"And now, ladies and gentlemen, my pleasant duties in these opening exercises will close after the next announcement. It is with burnished pride that I introduce to you to-day a civilian soldier whose master research in the fields of science has commanded the admiration of international mind, and whose place in the affectionate hearts of his associates in this body is second to none. I allude to Colonel Nicholas Senn, Surgeon General of the State of Illinois, and the thrice honored President of this Association."

Colonel B. J. D. Irwin, U. S. A., Vice-President of the Association, assumed the chair at this juncture of the proceedings.

(For President Senn's Annual Address, on "Abdominal Surgery on the Battle-field," see page 1.)

A motion was made by Doctor Gihon, which was duly seconded, that Colonel Senn's address be published at once, and a vote of thanks be tendered him for the able and scientific paper just read.

Adopted unanimously.

Major Henderson after a few preliminary remarks,

announced the programme of entertainments, receptions, etc., for the Fourth Annual Meeting, as follows:

The Social Headquarters of the Association will be at the Ebbitt House, corner of 14th and F streets, N. W.

There will be an exhibit of surgical instruments, surgical dressings, etc., at the Armory of the Washington Light Infantry Corps, on 15th street, near the corner of Pennsylvania avenue, N. W. Many of the leading business houses of the United States will be represented at this exhibit.*

The Committee rooms of the Committees on Registration and Transportation will be in this building. Registration will commence on May 1st, at 12 o'clock (noon). Return tickets will be signed May 2d, after 9 o'clock A. M.

The Army Medical Museum and Library, corner of 7th and B streets, S. W., near National Museum, will be open from 9 A. M. to 4 P. M. daily. In addition to the permanent collections, which are of well-known interest, there will be a special collection of litters in use in the U. S. Army, Navy, and National Guard.

The Naval Museum of Hygiene, on New York avenue, above 17th street, will be open from 9 to 4 daily.

The Soldiers' Home and Barnes Hospital, Lieutenant-Colonel Wm. H. Forwood, U. S. Army, in charge, accessible by cars starting from 15th and G streets, are open for visitors daily.

An informal reception will be given this evening by the Local Committee of Arrangements at the Ebbitt House, from 8 to 11 P. M.

On Wednesday afternoon the President and Mrs. Cleveland will receive, at the Executive Mansion, the members of the Association and ladies who accompany them, from 5 to 6 P. M.

The Corcoran Art Gallery will be open from 8 to 10 P. M.

On Thursday afternoon, a Litter and Ambulance Drill, and illustration of first aid to wounded on the field, by detachment of Hospital Corps, at Washington Barracks, at 3 P. M. Take Pennsylvania avenue cable cars, exchange at Seventh street. This drill will be over in time for members to take boat at Seventh street wharf, within easy walking distance.

Excursion down the Potomac river to Marshall Hall, where a "planked shad bake" will be served. The steamer will leave Seventh street wharf at 4:30 P. M.

Colonel Henry, of the Army, has extended an invitation, through Colonel Alden, to the delegates to visit Ft. Myer, Va., to witness an exhibition Calvary Drill on Friday morning.

A line of tally-ho coaches will leave the Ebbitt House at 9 A. M., fare round trip 50 cents. The coaches will return to the city by way of Arlington Heights.

On the morning of the 4th of May, all who desire to visit the battle-fields of Bull Run, Virginia, can leave Washington at 8 o'clock, on a special excursion train, and return at 8 P. M. to the city. Fare round trip, \$2.00.

The Committee of Arrangements will serve a luncheon that day on the battle-field. A number of gentlemen will accompany the excursionists, who participated in these battles, both in the Federal and Confederate service.

At 12:30 P. M. the Convention adjourned to meet at 2 P. M.

FIRST DAY—AFTERNOON SESSION.

PROGRAMME.

NATIONAL MUSEUM, 9th AND B STREETS, S. W.

1. *History*:—Major CHARLES SMART, Surgeon U. S. Army, Washington, D. C.
2. *Litter and Ambulance*:—Major VALERY HAVARD, Surgeon U. S. Army, Fort D. A. Russell, Wyoming; Captain MYLES STANDISH, Assistant Surgeon M. V. M., Boston, Mass.; Captain F. J. IVES, Assistant Surgeon U. S. Army, Fort Sheridan, Ill.; Captain J. D. GLENNAN, Assistant Surgeon U. S. Army, Fort Sill, Oklahoma Territory.
3. *Travels*:—Major JOHN VAN R. HOFF, Surgeon U. S. Army, Governor's Island, N. Y.
4. *Railway*:—Colonel LOUIS W. READ, Surgeon-General Pennsylvania, Norristown, Penn.
5. *On Board Ship*:—Medical Director ALBERT L. GIHON, U. S. Navy, Washington, D. C.

ADDENDUM:—"A Field Hospital Kitchen Wagon for Sterilizing Dressings at Dressing Stations and on the March," Captain H. O. PERLEY, Assistant Surgeon U. S. Army, Plattsburgh Barracks, N. Y.

Pursuant to adjournment the Convention was called to order by President Senn, a full representation of the members and delegates being present.

The reading of papers continued through the afternoon without an omission or interruption, until just prior to adjournment.

On motion of Major Carr, which prevailed, the President was authorized to appoint a Committee on Litter (of three), to investigate the most practicable and useful litter extant, and report at the next Annual Meeting.

Committee on Litter.

Major Jno. Van R. Hoff, U. S. A.
 Dr. A. L. Gihon, U. S. N.
 Capt. Myles Standish, M. V. M.

On Motion of Colonel Chancellor, the reports of Secretary and Treasurer were laid over until last day of meeting, for good cause.

Carried.

The Secretary read the following notice:

NAVY DEPARTMENT, WASHINGTON, D. C., }
April 19th, 1894. }

Sir:—Proceed to Washington, D. C., and report to the President of the Association of Military Surgeons of the United States on May 1st next for temporary duty as a delegate to represent the Medical Department of the Navy at the meeting of the Association, to be held at Washington, D. C., beginning on that date.

Upon completion of this duty, return to Annapolis, Md., and resume your present duties.

Very respectfully,

(Signed) W. McADOO,

Acting Secretary of the Navy.

Surgeon H. G. BEYER, U. S. Navy,

Naval Academy, Annapolis, Md.

ENDORSEMENT.—U. S. Naval Academy, Annapolis, Md., forwarded April 20th, 1894, (signed) R. L. Phythian, Captain U. S. Navy, Superintendent.

At 5.30 P. M. a recess was taken until 9 o'clock, Wednesday morning.

E. Chancellor,

Secretary.

SECOND DAY—MORNING SESSION.

PROGRAMME.

NATIONAL MUSEUM, 9th AND B STREETS, S. W.

1. "*Notes on the Introduction of Tent Field Hospitals in War*," by Colonel B. J. D. IRWIN, Assistant Surgeon-General U. S. Army, Chicago, Ill.
2. "*Brief Notes on Ship, Hospital, Barrack and Camp Furniture, and on Electric Heating and Cooking*," by CHRISTOPHER J. CLEBORNE, Medical Director U. S. Navy, in charge of U. S. Naval Hospital, Chelsea, Mass.
3. "*The Medical Officer at the Summer Encampments*," by Lieutenant-Colonel CHAS. R. GREENLEAF, Dep. Surgeon-General U. S. A., San Francisco, Cal.
4. "*The Diet of the National Guard in Summer Encampments*," by First Lieutenant CHARLES W. GALLOUPE, Assistant Surgeon Battery A, M. V. M., Boston, Mass.
5. "*The Naval Medical Officer on Expeditionary Boat Duty*," by Surgeon JOHN C. WISE, U. S. Navy.
6. "*The Red Cross*," by Lieutenant-Colonel LEONARD B. ALMY, Medical Director N. G. Connecticut, Norwich, Conn.
7. "*The Place of Physical Training in Military Service*," by Captain JAMES E. PILCHER, Assistant Surgeon U. S. A., Fort Niagara, N. Y.
8. "*The Relation of the National Guard Surgeon to the Medical Profession and to the Community*," by Captain T. C. CLARK, Assistant Surgeon N. G. Minnesota, Stillwater, Minn.

The Session was resumed at 9 A. M., with President Senn in the Chair. All papers on programme were read, and disposed of in usual routine.

President Senn stated that he would be pleased to hear from all committees at this time, who were ready with their reports:

REPORT OF PRIZE ESSAY COMMITTEE FOR 1893-1894.

The Committee beg leave to report that they consider it inexpedient at present to establish a fund for a prize essay. The committee would recommend to the Association the establishment

of a prize fund (\$500.00) the interest of which shall be devoted to purchasing bi-annually a bronze medal, this medal to be given to the prize essayist.

HERBERT L. BURRELL,
CHARLES HAYES,
WILLIAM H. EGLE,
Committee.

Accepted.

REPORT OF COMMITTEE ON LEGISLATION.

Mr. President and Gentlemen of the Association of Military Surgeons of the United States:—Your Committee to whom was referred the legislative affairs of the Association, respectfully report, that as by authority of the United States Government an Army Medical School has already been established, the efforts of your committee were directed towards the establishment of a uniform method of organization of "Medical Departments" and "Hospital Corps" throughout the military services of the various States, and with this in view, the following "circular letter" was forwarded in sufficient number of copies to fully supply every State in the Union, having an organization of a National Guard:

TECUMSEH, MICH., January 1st, 1894.

To the Adjutant-General of ——— and Chairman and Members of Committee on Military Affairs:

GENTLEMEN:—At the third annual meeting of the Association of Military Surgeons of the United States, held in Chicago, Ill., August 8, 9 and 10, 1893, resolutions were adopted requiring its Committee on Legislation to urge the legislatures of the several Commonwealths to establish by law, a Medical Department in their State Military Service, as nearly like that adopted by the United States Army, as the exigencies of your service will allow. Also to provide for the organization of a Hospital Corps, which shall be auxiliary to, and under the control of the Medical Department, which latter should consist of a Surgeon-General, who should be a member of the Staff of the Governor and Commander-in-Chief, Medical Directors, Surgeons and Assistant Surgeons bearing such rank as may be determined upon by the authorities in each State, or Military District, and placing Medical Officers definitely in the staff department, as members of a Staff Corps, where, from the nature of their service and position they justly belong. It is earnestly believed by this Association, that a comparative uniformity in the organization of Medical Departments, in the several States in the Union, placing each upon a proper footing, would do more to promote the welfare of the Service and the Troops in each State, than any simi-

lar legislation connected with the Service. It is, therefore, respectfully urged that such bills be drafted, and laws passed, as will bring about the desired result, and that before the close of the next session of your Legislature, a properly organized Medical Department may be established.

As this Association is composed of Medical Officers of the Regular Army, Navy and Marine Hospital Service, as well as the Medical Officers of the National Guard of the United States, the voice of the entire Medical Service of the United States urges upon your Honorable Body the earnest and favorable consideration of these matters.

C. M. WOODWARD, Chairman,

Ex-Lt.-Col. and Surg.-Gen. Mich. S. T., 50 Chicago St., East, Tecumseh.

LOUIS W. READ,

Colonel and Surgeon-General N. G. Pa., Norristown.

R. E. GIFFEN,

Colonel and Surgeon-General Neb. N. G., Lincoln.

W. F. DE NIEDMAN,

Major and Surgeon, Kan. N. G., Pittsburg.

T. W. EVANS,

Captain and Assistant Surgeon Wis. N. G., Madison.

Legislative Committee.

To this letter very favorable responses were received from many States. In some States, however, no legislatures or assemblies would convene before another year, hence it was impossible to obtain any definite expression. But no adverse criticism has yet been received from any State. Such as have reported, however, have been very favorably disposed toward the organization of a "Medical Department" and "Hospital Corps," upon such basis as this Association should devise as being best, or that, from the nature of existing laws in the respective States, they could accept.

Your Committee would also respectfully report that the Army Medical School as now organized, will only benefit officers who are to serve in the Regular Army, and that no provision has been made whereby the National Guard Surgeon could by any possibility receive any benefit from this school. It is therefore respectfully suggested that Resolutions be offered, or a memorial to Congress, or other proper authority be made for allowing National Guard

Surgeons the privilege of availing themselves of the benefits of the Army Medical School, in a similar manner to those officers who are to serve in the Regular Army.

C. M. WOODWARD,
LOUIS W. READ,
R. E. GIFFEN,
W. F. DE NIEDMAN,
T. W. EVANS,
Committee.

Accepted.

REPORT OF THE COMMITTEE ON SANITATION AND HYGIENE.

The Committee on Sanitation and Hygiene beg herewith to report, that in their opinion the Association should be instrumental in the elaboration of regulations embracing the whole field of sanitation and hygiene, adaptable to the regular, militia and volunteer services of the United States Army and Navy. While such regulations, binding alike on the surgeon and his commander, are part of the rules of foreign services, the United States forces have but general instructions, leaving the sanitary work much to the particular views and zeal of the Medical Officer, often impeded by opposed views as to right of the Medical Service on the part of the Commanding Officers.

Since it is conceded that the sanitary duties of Medical Officers are of the utmost importance in the preservation of the effectiveness of a command, such duties should be made specific by carefully considered regulations, and this Association, composed as it is of influential surgeons of the National Guard, is eminently in the position to bring about the adoption of regulations in the several States, which the regular services, as would not admit of a doubt, would make use of such work for the United States forces.

It is therefore again recommended that a prize essay be invited for separate Regulations for the land and naval forces, specifying the routine of the Sanitary service as well as the action of the Medical Department in extraordinary cases.

Such an essay was recommended by the President of this Com-

mittee, two years ago, in a paper published in the Proceedings of this Association at the St. Louis Meeting, and a committee was appointed to attend to this matter, but without results so far.

It is recommended that the invitation for prize essays be renewed and that a prize of three hundred dollars be paid respectively to each of the writers of the best essays adopted, and that the essays then become the property of the Association; and that the judges of these essays be appointed by the President of the Association from the respective services, not less than three judges for each essay. That after acceptance of these essays they be adopted, as modified by a committee of the members of the Association to be appointed by the President, and then laid before a regular meeting for final action.

It is believed that the royalty on such Regulations would not only reimburse the Association, but prove a permanent revenue.

A. C. GIRARD, Chairman.
A. H. BRIGGS,
H. L. MCKINSTRY,
Committee.

Accepted.

REPORT OF COMMITTEE ON BADGE AND SEAL.

Mr. President and Gentlemen of the Association of Military Surgeons of the United States:—Your Committee on Badge and Seal have the honor to report that since the adoption of the badge, at the Third Annual Meeting in Chicago, in August, 1893, the seal accepted by your committee, is a "die" from the badge then adopted, without the ribbon attached. Some slight changes have been made in the ribbon, with the effect of beautifying its appearance. As now adopted by your committee, the ribbon is to be of heavy gros-grained and watered silk, eleven-eighths of an inch wide. There shall be one wide central stripe of white, and bordered on either side with a stripe of red. Each red stripe to be three-eighths of an inch wide, and the white stripe five-eighths of an inch wide, and attached to the badge by means of a "hanger" and "ring," through which latter the ribbon is passed

and attached at the top of the ribbon to a hidden bar-pin, which is more convenient for use and more secure, there being less danger of the loss of the badge, to which members would have been subjected if the "hook and eye" method originally suggested had been adhered to. In the opinion of the committee, the badge and its hangings are now all that could be desired.

As the Barr Dry-Goods Company, of St. Louis, Mo., furnished the finest and best samples of ribbon for the Official Badge, and at a much less price also, than other firms had charged for an inferior article, this company was accepted as the Official Furnishers of the ribbon by the entire committee.

Members desiring fresh supplies of the Official Ribbon should always order the same through the Secretary of the Association, as that is the only manner in which it can legally be obtained.

Respectfully submitted,

C. M. WOODWARD,
B. J. D. IRWIN,
H. E. BRADLEY,
Committee.

Accepted.

REPORT OF COMMITTEE ON INTERNATIONAL CONGRESS OF MILITARY SURGEONS.

On behalf of the committee appointed by the Association to consider the subject of an International Congress of Military Surgeons, I have the honor to say that an extended correspondence has been carried on with domestic and foreign military men, who, in general, responded favorably to the project, and it would seem advisable to continue the work in this direction, taking the necessary steps to organize for such a meeting in the near future.

The committee is not prepared to make any definite report at this meeting, and as some of its members have ceased to hold official positions, it is suggested that the present committee be discharged and another committee appointed, with the necessary authority to act between the sessions of the Association, and to

confer with the proper Congressional and Executive Department officials of the Government for such aid as may be required to further the interests of the Congress.

CHARLES R. GREENLEAF,
Chairman.

Accepted.

On motion of Major Hoff it was voted that a committee on "Red Cross Affairs" be appointed by the President, to consist of three members, who are to report this afternoon.

Committee on Red Cross Affairs.

Dr. A. L. Gihon,
Colonel L. B. Almy,
Major Charles Smart.

A recess was taken until 2 P. M.

SECOND DAY--AFTERNOON SESSION.

PROGRAMME.

NATIONAL MUSEUM, 9th AND B STREETS, S. W.

1. "*Weapons of War, Illustrated with Examples of Modern Small Arms, Projectiles, and Smokeless Powder,*" by Lieutenant-Colonel WILLIAM H. FORWOOD, Deputy Surgeon-General U. S. A., Washington, D. C.
2. "*Easy Methods of Carrying out the Principles of Aseptic Surgery,*" by Colonel ROBT REYBURN, late Surgeon and Brevet Lieutenant-Colonel U. S. Vols., Washington, D. C.
3. "*The Germicidal Value of Trikresol,*" by Major WALTER REED, Surgeon, U. S. Army, Washington, D. C.
4. "*The Action of Rattlesnake Venom upon the Bactericidal Power of the Blood Serum,*" by Captain CHAS. B. EWING, Assistant Surgeon U. S. Army, Fort McHenry, M. D.
5. "*Penetrating Wounds of the Abdomen,*" by Captain E. J. MEYER, Assistant Surgeon 65th Regiment, N. G. New York, Buffalo, New York.
6. "*Pernicious Fever.—A Translation of Chapter VII from Doctor Torres Homenis' Clinical Study of the Fevers of Rio de Janeiro,*" by Surgeon GEORGE P. BRADLEY, U. S. Navy.
7. "*The Remote Effects of Gunshot Wounds of the Extremities,*" by Lieutenant-Colonel C. M. WOODWARD, Ex-Surgeon-General Michigan State Troops, Tecumseh, Michigan.
8. "*The Antiseptic Treatment of Gunshot Wounds of the Liver, with Report of a Case,*" by Captain GEORGE E. BUSHNELL, Assistant Surgeon U. S. Army, Fort McKinney, Wyoming.

The Association re-assembled at 2 P. M., with President Senn in the chair, who at once announced the members of the Nominating Committee as follows:

NOMINATING COMMITTEE.

Colonel Francis J. Crane.....	Colorado.
Colonel Leonard B. Almy.....	Connecticut.
Major William Marshall.....	Delaware.
Major George Henderson.....	District of Columbia.
Captain Robert P. Izlar.....	Florida.
Captain Charles Adams.....	Illinois.
Major W. H. Lopp.....	Indiana.
Captain Thos. P. Grant.....	Kentucky.
Major W. F. de Niedman.....	Kansas.
Captain John W. Linthicum.....	Maryland.
Captain Myles Standish	Massachusetts.
Colonel C. M. Woodward.....	Michigan
Major Howard L. McKinstry.....	Minnesota.
Major George Halley.....	Missouri.
Colonel R. E. Giffen.....	Nebraska.
Colonel Charles F. W. Myers.....	New Jersey.
General George Cook.....	New Hampshire.
Major Albert H. Briggs.....	New York.
Captain Gilbert I. Cullen.....	Ohio.
Surgeon Wm. Henry Egle.....	Pennsylvania.
Colonel Charles Hayes.....	Rhode Island.
Captain Roger A. Smith.....	North Carolina.
Captain Horace E. Mann.....	Wisconsin.
Major M. C. Barkwell.....	Wyoming.
Major Jno. R. Van Hoff.....	United States Army.
Doctor Albert L. Gihon.....	United States Navy.
Doctor Walter Wyman.....	U. S. M. H. S.

The reading of papers assigned for this session was continued as usual.

REPORT OF THE COMMITTEE ON ACT OF CONGRESS PROPOSED
FOR THE PROTECTION OF THE INSIGNIA AND NAME
OF THE RED CROSS.

Whereas, in the International Convention at Geneva, Switzerland, August 22, 1864, twelve nations of the world met and formulated Articles of Treaty, for the purpose of mitigating the evils inseparable from war; of suppressing the needless severity; and particularly providing that persons employed in hospitals, and in affording relief to the sick and wounded, and supplies for this purpose, shall be deemed neutral and entitled to protection; and that a distinctive and uniform flag shall be adopted for hospitals and ambulances, and convoys of sick and wounded, and an arm badge for individuals neutralized; and

Whereas, said Treaty has been ratified by every civilized nation of the world with one or two exceptions of minor importance; and

Whereas, the flag adopted was the distinctive sign of the Red Cross alone, under which insignia or sign the purposes of the Treaty shall be carried into effect, the same being a red Greek cross on a white ground, and which shall constitute the military hospital flag of all the nations within the Treaty and designate all persons serving under it; and the same is adopted and used throughout the world; and

Whereas, the United States gave its adhesion by Act of Congress, March 1, 1882; the agreement was ratified by the International Congress of Berne, June 9, 1882, and proclaimed by President Arthur, July 26, 1882, thus adopting by solemn compact and treaty, this universal and only military hospital flag; and as the insignia is prescribed in the United States Army Regulations, they are a part of the equipment of regular armies and militia, and are incorporated in the Rules of the Government and Regulations of the Land Forces; and,

Whereas, the unauthorized use of said insignia in all countries within the treaty, becoming a source of embarrassment and serious injury, causing perplexing complications to arise, nearly all of the nations under said Treaty have taken vigorous action against this

evil, and have passed stringent laws with heavy penalties for the protection of this special insignia; and

Whereas, the same great evil exists to-day in this country—the merchant prince, the manufacturing chemist, the speculator and huckster alike, seizing upon and adopting for purposes of trade and barter, this greatest of humanitarian emblems, made sacred by solemn compact and the wisest counsel; and

Whereas, the fact becoming known that this country has no laws for the protection of the Red Cross, the whiskies, drugs, pills and nostrums of the world, bearing the Red Cross on their labels are being imported; thus the laws for the protection of the sign in other countries, are working us positive injury, and unless this wrong shall be righted and this Congress protect the interests of the Government, the Red Cross will be brought into such contempt that its value as a relief sign will be gone and its usefulness utterly destroyed; and

Whereas, the American National Red Cross—the United States branch of the International Red Cross—has through its honored President, Miss Clara Barton, been endeavoring for five years to secure by Act of Congress, at least a measure of the protection which is accorded this emblem in other countries; and

Whereas, a Bill "To protect the insignia and the name of the Red Cross" was introduced in the House of Representatives this session, and on the 23d of March, passed unanimously, without alteration or amendment, referred to the Senate, read twice and referred to the Committee on Foreign Relations; Now, therefore, be it

Resolved, that we, The Association of Military Surgeons of the United States, in Congress assembled, do earnestly recommend the Bill now before the Committee on Foreign Relations, for the protection of the insignia and name of the Red Cross, and urge its immediate passage. Respectfully submitted.

ALBERT L. GIHON,
Medical Director U. S. Navy.

LEONARD B. ALMY,
Lt.-Col. and Med. Dir. Conn. N. G.

CH. SMART,
Major and Surgeon U. S. Army.
Committee.

On motion of Doctor Gihon, which carried unanimously, a committee of five was appointed to confer with the Congress of Physicians and Surgeons, in reference to the admission of this Association as a member of that body, the President Ex-Officio to be made chairman.

Committee of Conference.

President Ex-Officio,
Doctor A. L. Gihon,
General J. D. Bryant,
Captain James E. Pilcher,
Capt. T. C. Clark.

Colonel Woodward, chairman, submitted the following report of the Legislative Committee:

That such action be taken by the Association as will tend to secure to Medical Officers of the National Guard, and Naval Reserve, the same advantages and privileges, resulting from the establishment of the Army Medical School and Naval Medical School, as those accorded to Medical Officers of the Regular Army and Navy.

C. M. WOODWARD,
LOUIS W. READ,
R. E. GRIFFEN,
W. F. DE NIEDMAN,

Committee.

Report accepted. Resolution adopted.

On motion of Colonel Woodward it was voted that a committee of four be appointed by the chair, to consider the whole question of the organization and nature of the American branch of the Red Cross Society, the Medical Departments of the National Guard and public service.

Adopted.

Committee.

Colonel L. B. Almy,
Major Charles Smart,
Doctor A. L. Gihon,
Col. Charles M. Woodward.

Vice-President, Col. Louis W. Read, having taken the chair:

The President, Col. Nicholas Senn:—Mr. President, we can regard ourselves as a branch of that great army which is employed in giving relief to the sick and suffering throughout the world in time of peace and war, and I therefore take great pleasure in introducing to the members of the Convention the heroine of the Red Cross, Miss Clara Barton.

Miss Barton was received with applause, and invited to a seat on the platform.

At 4 o'clock P. M., the Convention took a recess, to meet at the Ebbitt House at 7:30 P. M.

SECOND DAY—EVENING SESSION.

The Convention reassembled in Executive Session at 7:30 P. M., with President Senn in the chair.

President Senn:—Mr. Secretary, have you any business that you wish to bring to the attention of the convention before reports from committees are called for.

The Secretary, Colonel Chancellor:—Mr. President, I have nothing on the table, but move you, sir, that Col. Forster be appointed "officer of the day."

Carried.

The President, Colonel Senn:—The Committee on Nominations desires to make a report. The chairman of that committee, Col. Crane, has the floor.

Colonel Crane:—Mr. President, I have the honor to submit the following report from the Committee on Nominations:

NOMINATIONS FOR OFFICERS—1894-1895.

President—GEORGE M. STERNBERG, Brigadier-General and Surgeon-General, U. S. Army, Washington, D. C.

Vice-President—LOUIS W. READ, Colonel and Surgeon-General. N. G. Penna., Norristown, Penna.

2d Vice-President—ALBERT L. GIBON, Medical Director, U. S. Navy, Washington, D. C.

Secretary—EUSTATHIUS CHANCELLOR, Lieutenant-Colonel and Medical Director, N. G. Mo., 515 Olive Street, St. Louis, Mo.

Treasurer—LAWRENCE C. CARR, Major and Surgeon, N. G. Ohio, 143 W. 7th Street, Cincinnati, Ohio.

Chairman Committee of Arrangements—ALBERT H. BRIGGS, Major and Surgeon, N. G. S. N. Y., 267 Hudson Street, Buffalo, N. Y.

TO MEET AT BUFFALO, N. Y., MAY 21st, 22nd and 23rd, 1895.

Major Briggs:—Mr. President, under our Constitution the officers of the Association should be elected by ballot. I move that the Secretary be instructed to cast the ballot for the officers who have been placed in nomination by the Committee on Nominations.

The motion was carried, and the President announced the result of the ballot as follows:

For President, Surgeon General George M. Sternberg; First Vice-President, Colonel Louis W. Read; 2d Vice-President, Doctor Albert L. Gihon; Secretary, Colonel E. Chancellor; Treasurer, Major Lawrence C. Carr; Local Chairman Committee on Arrangements for 1895, Major Albert H. Briggs.

The President announced that Buffalo, New York, being the unanimous choice of the committee, would be the place for the next Annual Meeting of the Convention.

The President, Colonel Senn:—Gentlemen of the Convention, we should express our gratitude in some way to Colonel Read for the patriotism he has exhibited in declining the nomination for President in favor of General Sternberg. In what manner that shall be done, is the pleasure of the Association. But I am sure we owe a debt of gratitude to Colonel Read.

Colonel Read:—Mr. President and Gentlemen of the Convention. This is not a personal matter with me; I have no further object than that of promoting the welfare of the Association. I wish you to understand distinctly that the delegation of Pennsylvania is behind me in the movement that has been made to secure my nomination, but I was not and am not an aspirant for the position. Personally I would not like to have it. The delegation from Pennsylvania, though, thought it would be an honor if Pennsylvania could secure the office. I thought so too; but had I known that General Sternberg was a candidate I should have withdrawn earlier. I give way to-night with pleasure in his behalf. (Prolonged applause.)

On motion of Colonel Senn, which prevailed, Major Henderson was appointed a committee of one to wait upon General Sternberg and inform him of his election as President of the Association for the year 1895.

Capt. Grant:—Mr. President, I submit the following resolution.

Resolved—That a committee of three be appointed to secure the official recognition of the badge of this Association, by the passage of an act by Congress and the several States, authorizing members to wear the same on all occasions of ceremony.

Adopted.

The chair appointed—

Committee on Official Recognition of Badge.

Captain Thomas P. Grant,
Colonel Edward J. Forster,
Major John Van R. Hoff.

Colonel Woodward:—Mr. President. Be it resolved that should it be possible for the badge of this Association to be worn by officers of the Army under the same circumstances as the badges of the Loyal Legion and other Military

Societies, and that the proper steps be taken to secure that authority.

Resolution accepted.

Colonel Forster:—Mr. President, I move that the Secretary of the Association be directed to have reprinted 500 copies of Volume 1, 1891, of the Proceedings of this Association.

Adopted.

Colonel Almy, chairman of the Committee on Finance and Auditing Accounts, submitted the following report:

Mr. President:—The following abbreviated report of the receipts and disbursements of the Association since the last meeting in August, 1893, is respectfully submitted by the Finance and Auditing Committee:

RECEIPTS.

From Members.....	\$ 787.00
For Advertisements in the Transactions	316.50
From late Treasurer.....	64.00
Total Receipts.....	\$ 1167.50

DISBURSEMENTS.

Expended by Treasurer.....	\$ 84.65
Expended by Secretary.....	333.15
On loan of Colonel Nicholas Senn....	100.00
On loan of Colonel E. Chancellor....	100.00
Printing, \$10.70; services of reporter, \$4	14.70
Bill of Journal A. & M. Association...	20.00
Cost of publishing the last Transactions.	485.30
Total Expenditures.....	\$ 1137.80
Balance	29.70

A detailed or itemized report will be furnished by the Treasurer, whose vouchers have been examined and found correct.

As a few of the sight-drafts drawn on members in arrears were

not honored, it is hoped that some other method may be suggested to induce delinquent members to liquidate their indebtedness to the Association.

ROMULUS A. FOSTER,
LEONARD B. ALMY,
Finance and Auditing Committee.

Report accepted.

It is moved that an order be drawn on the Treasurer for \$17.00 to reimburse Major Briggs for amount paid the Special Agent of the Trunk Line Association for two days service in the interest of this Association.

Adopted.

Major Carr: —Mr. President and Gentlemen of the Convention. You have heard the recapitulated report presented by the Committee on Finance. I have here 22 pages of type-written matter showing the standing of the Association, and if you think you can stand hearing it read, I will read it; if not, it will remain here for the inspection of such members as may wish to examine it.

I wish to say that in the prosecution of the work I have had for an assistant this clever officer, Capt. Cullen. He is sitting here ready to take \$5.00 from any member who has forgotten to pay, and to give a receipt for the same. It will not be any interruption for the members to come forward and pay while I am reading this report.

I beg to submit the following: Gen'l J. D. Bryant sent to me a letter which called my attention to an enclosure of Five Dollars (\$5.00). Although I found no money or check in the envelope, I sent him a receipt and a letter asking an explanation. To-day he informed me that he had enclosed a bill in the letter, and of this fact there can of course be no doubt. As I did not receive the money, he offered to pay it again. This I refused to accept, as it is already charged in my account. If the Auditing Committee deem it proper I should stand the loss, so let it rest. Further, in Chicago I received \$218.00 in cash, for which no receipts have been given, and no proper list of names furnished me to credit. In my correspondence with the gentlemen of the Association I stated to them the chaotic

condition of affairs, asking them to send me word in case the bill-presented were not correct, and saying that on receipt of answer the statements made to me would stand as their accounts unquestioned on the books. In following out this plan, I have found that the \$218.00 paid to me in Chicago could by no system of mathematics be made to cover the claims, amounting to \$257.00, made against it. And thus your Treasurer is still looking for \$39.00 which up to date has failed to put in an appearance.

L. C. CARR,
Treasurer.

Col. Myers:—Mr. President, I move that in order to get our books straightened out, Major Carr be relieved from any responsibility to the Association for the money with which it now appears he is technically but not in fact chargeable.

Motion Adopted.

Capt. Clark:—Mr. President, I desire to make a few remarks in regard to the manner of collecting dues. At our last annual meeting the dues were greatly in arrears. The question of the best method of making collections was then elaborately discussed. Members were informed repeatedly of their indebtedness to the Association, but they failed to respond. A resolution was passed to the effect that each member in arrears should be notified of such arrears, and if he did not respond in a certain time the Treasurer should draw on him at sight. The Treasurer gave ample time for the arrears to be paid, and finally drew on all members who were in arrears. I am informed that some fifty members coming under that head failed to respond. I apprehend that out of that fifty, through some mistake, or something wrong with the books, there were some who had previously paid but who were not credited. I was one of that number. The Secretary drew on me. I sent him \$2.00. I did not get my money's worth, but the Association had the benefit of it.

I do not believe that some other method should be adopted, and I shall oppose any change. I am in favor of

following the same method. I would suggest that, in order to give an opportunity to those who are laboring under a misapprehension, the Secretary or Treasurer draw on those fifty members who failed to respond, and after a second call and failure, to drop their names from the roll. I do not think that any member who fails to respond to such a call is fit to be a member of the Association. The Association is incurring obligations which should be paid. For these obligations each member is in part held responsible. If he fail to respond under such circumstances, his name should be dropped from the roll. If this course be followed we shall have a good active society, composed of good active timber.

Col. Foster:—Drawing on a member is rather rough usage. I think he should have a notice sent to him first; and I would suggest a registered letter, which will cost but ten cents. In this way, if the member sign the receipt, on its return by the Post Office Department you will know that he has heard from the Secretary. Then, if he continue in arrears, you can call on him.

Dr. Gihon:—Mr. President, I happened to be one of the unfortunates. A collector came into my office with one of these unpleasant sight-drafts after I had sent my check to Col. Carr. I agree with Col. Foster. No man wishes a collector to come into his office and ask for the payment of a draft. I also think that a registered letter should be sent, and a reasonable time allowed to elapse after the return receipt before the call is made.

Major Carr:—Mr. President, I do not know whether all this is meant for me or the other fellow; but the Association finding itself in debt last year passed a resolution that thirty days after sending the bill the Treasurer should draw on the delinquent. I used my own discretion in the premises, and I sent a distinct notification, especially in the case of the medical gentleman in the Navy. The draft that went to him had on it the same address that the three communications previously sent to him contained.

Dr. Gihon:—I confess that I did not get them.

Major Carr:—I made a very honest effort to discharge my duty. I do not think that any gentleman in the Association dislikes being drawn on more than I do. I sent out a total of 63 drafts, and there were nearly 230 members. You will, therefore, understand that I asked some before I resorted to the drafts. I will state further that out of the fifty delinquents when I made out my report, twenty-six were satisfactorily accounted for, which left twenty-four.

General Burrell:—Mr. President, the Executive Committee has had this matter under consideration; and, appreciating the onerous duties of our Treasurer and the satisfactory manner in which he has conducted them, we felt that it was only fair that the responsibility of dunning members should be divided. We, therefore, are going to suggest an amendment to the by-laws, by which delinquents shall be referred to a committee on delinquents, thus dividing the responsibility of dunning. Under the contemplated amendment the Committee on Delinquents will be required to report in thirty days to the Treasurer or the Executive Committee what action shall have been taken to procure settlements. It may be as suggested that it would be better to communicate by registered letter at first, and then a notice requesting an assignment of reasons why the delinquent should not be dropped from the roll. I thought I would state this now, as the Executive Committee will on to-morrow present this question to the Association, and with Capt. Clark's consent I will move to lay this matter on the table until the Executive Committee shall have reported.

Adopted.

On motion of Colonel Giffen, the Association adjourned at 10.30 p. m., to convene to-morrow morning at 9 o'clock.

E. Chancellor,

Secretary.

THIRD DAY—MORNING SESSION.

PROGRAMME.

NATIONAL MUSEUM, 9th AND B STS. S. W.

1. "*Records and Blanks for Medical Department, Massachusetts Volunteer Militia, with Specimens,*" by Lieutenant-Colonel E. J. FORSTER, Medical Director M. V. M., Boston, Mass.
2. "*Field Work of the Hospital Corps, as Affected by Modern Projectiles,*" by Major H. S. TURRILL, Surgeon U. S. Army, Hospital Corps School of Instruction, Fort Riley, Kansas.
3. "*On First Aid on the Battlefield,*" by Surgeon HENRY G. BEYER, U. S. Navy.
4. "*Some Observations on the Organization and Efficiency of the Hospital Corps and the Work of the Medical Corps in Time of War,*" by Captain JUNIUS L. POWELL, Medical Department U. S. Army.
5. "*Equipment and Instruction of Sanitary Soldiers,*" by Captain CHAS. F. MASON, Assistant Surgeon U. S. Army, Fort Snelling, Minn.
6. "*The Personal Equipment of the Sanitary Soldier,*" by First Lieutenant GEO. D. DE SHON, Assistant Surgeon U. S. A., Fort D. A. Russell, Wyoming.
7. "*The Latest Experiments in the Effect of Small-Calibre Rifles,*" by Major ALFRED C. GIRARD, Surgeon U. S. Army, Chicago, Ill.
8. "*The Rise of the Medical Department of the N. G. of Pennsylvania,*" by Major WILLIAM H. EGLE, Surgeon N. G. of Pennsylvania, Harrisburg, Penn.
9. "*The Hygienic Condition of Enlisted Men as Affected by Moral and Intellectual Influences,*" by Surgeon HOWARD E. AMES, U. S. Navy.
10. "*The Military Sanitary Organizations of Some of the Great Armies of the World,*" by Major JOHN VAN R. HOFF, Surgeon U. S. Army, Governor's Island, New York.
11. "*The Special Training of the Medical Officer, with brief Notes of the Course of Instruction at Army Medical Schools, Abroad and at Home,*" by Dr. C. H. ALDEN, Assistant Surgeon-General U. S. Army, Washington, D. C.
12. "*Observations upon the Medical Department of the British Army—Abridged from an Official Report of Observation Made in 1891.*" by Brevet Lieutenant-Colonel ALFRED A. WOODHULL, Major Medical Department United States Army.

The Association was called to order at 9 o'clock by President Senn. The first order of business was the delayed reports of committees.

The Annual Report of Secretary, Colonel E. Chancellor, was read in detail as follows:

SECRETARY'S REPORT.

Mr. President, Officers and Members of the Association of Military Surgeons of the United States:

Gentlemen:—In compliance with the laws of the Association of Military Surgeons of the United States, I have the honor to submit the Third Annual report; being a condensed statement of work accomplished since the Third Annual Meeting held in the City of Chicago, Ill., on August 8th, 9th and 10th, 1893, to the end of the present fiscal term, April 30th, 1894, inclusive, which is as follows:—

MEMBERSHIP.

The Roster has undergone a complete revision since our last Annual Meeting. Many changes in titles and addresses of members have been made, and we have now enrolled 213 names on the active list, 24 on the honorary list and 3 on the contributing list. The active list has lost 2 members by resignation during the year on account of political vicissitudes and an honorable discharge.

The increase in membership of 37 active and 4 honorary members, during the past year, is due chiefly to the courtesy of Col. Alden, Dr. Gihon, Col. Senn, General Burrell, Col. Read and Capt. Cabell; and it is a source of much regret that other medical officials in the several States have been unable to achieve anything in the way of organizing State Institutions or increasing the membership.

Since the issue of the Fourth Annual Announcement, many complaints have reached your Secretary that no mention had been made of resignations and retirements of our members in the National Guard, and the cause for the seeming negligence may be briefly cited. An unquestionable apathy exists in many States, in the ranks of the National Guard, and some Adjutants General and Surgeons

General possess the eccentric individuality of never replying to any civil requests except their signatures gained from registered letters. These gentlemen have ignored all appeals for information concerning changes made in the medical corps of their State's militia. This lack of decorum is noted, too, in a few civilian soldiers, to whom your Secretary has again and again written for a certain knowledge of facts concerning State affairs, but no reply has been received. By reason of this indifference manifested from several sources, it has been deemed prudent and for the best interest of the Association, that all members retain the same rank as held at the time of becoming members of the Association, and unless promoted, when the change can be made without any reflection or humiliation. Many members, however, have very courtly informed your Secretary of resignations and retirements from the service, and desire that they be so recorded in the Roster, yet a few prefer that the Secretary remain in total ignorance of their honorable discharge. This embarrassing theme must be intrusted to the Executive Committee, who will no doubt solve this and other delicate problems.

At the Second Annual Meeting of this Association, the subject of admitting Surgeons who had been engaged in the late civil war, both ex-federals and ex-confederates, was discussed by the Committee on Laws, but never reached a vote by the Convention. It is well-known that many of them, distinguished surgeons of the North and South, whose names are familiar to all of us, are anxious to become honorary members of this organization, and only await an invitation through your Executive Committee, to participate with us.

CERTIFICATE OF MEMBERSHIP.

The work of distributing new diplomas to all members who had complied with the Constitution and By-Laws as revised August, 1893, was no small undertaking, as such a task could not be executed single-handed, consequently, an ornamental penman and the services of an efficient clerk were secured, and the repetition of the prodigious work of more than one year ago was thoroughly gone over and satisfactorily consummated, though at a great sacrifice

of time and labor to your Secretary. Just as we had finished the task of mailing about half of the diplomas, the balance (about 120) having been shipped by express to the President for his signature, the shocking intelligence was received a few days later that the package of diplomas had been lost in the return transit. The Secretary's dilemma can better be imagined than described! To a liberal use of printer's ink and the local columns of the daily papers of St. Louis, we are indebted for the return of more than half in a damaged condition; the rest having been lost. The Express Company paid the claim in full.

An ornamental penman was employed officially, during the year, to fill in diplomas in script at ten cents apiece, and where the English text was preferred, a charge of twenty cents apiece was the custom. A few members, however, gladly paid the difference and had their certificates written in text. The several promotions and changes frequently occurring in rank have been the cause of many inquiries from members as to the mode and cost of furnishing duplicate certificates, and on two occasions requests were complied with at a cost of fifty cents for each diploma. In all cases certificates of membership have been sent out in mailing tubes at letter postage rates.

BADGE AND RIBBON.

The Badge Committee have generously imposed upon your Secretary an additional labor, that of purchasing and keeping in stock the official ribbon, which is to be sold to members at fifty cents per yard, and half yards at twenty-five cents; invariably cash in advance, as no accounts are kept for such minor transactions. The diploma ribbon is much cheaper and of lighter grade, and used only on Certificates of Membership by the Secretary. The law governing the manufacture of badges still remain rigidly in force, which requires that a member can only secure a badge of the manufacturers on application to the Secretary, which appears to be wise ruling, since two non-members, in the early organization of this body purchased and received the then official badge, merely on application to the makers. The law should be made to include the

official button as well as badge. I learn from the manufacturers that 98 members have been supplied with badges at \$10.00 apiece, and 73 with official buttons at \$2.00 apiece. The badge committee may be able to explain why other members in good standing do not purchase badges or buttons. It should be borne in mind that very liberal concessions have been made by the manufacturers, they consenting to make all necessary changes in the old badge, so as to conform to the Constitution and By-Laws of August, 1893, without extra charge to members.

ANNUAL PROCEEDINGS AND DISTRIBUTION.

The Proceedings of three Annual Meetings have been published by the Association. Of the first volume, only a limited number of copies were issued, which have long since been exhausted, and we regret that the frequent demands for them have not been fulfilled.

The Second Volume, of 190 pages, was ready for delivery very soon after the Second Annual Meeting, and was distributed and accounted for as described in Volume III, pages 74 and 75.

The Third Annual Volume, of 275 pages, was received from the publishers about the 1st of April, 1894, and distributed immediately as follows:—One copy being sent to each active, honorary and contributing member, to the Editors of many prominent Medical Journals and the Daily Press, several Libraries, all Adjutant Generals of the National Guard of the United States, Heads of the Departments of the Army, Navy and Marine Service, a half-dozen citizens of St. Louis who were conspicuous factors in the success of the meeting of 1892, and to each chemist as represented in Volume III of the Proceedings,—which amount to 348 copies. The number of volumes of the Transactions now on hand are as follows:—

241 copies Volume II, 1892.

143 copies Volume III, 1893.

5 copies Volume II, 1892. Philip Roeder, St. Louis, Mo.

9 copies Volume III, 1893. Washington Meeting, 1894.

5 copies Volume II, 1892, Washington Meeting, 1894.

The distribution of the Third Annual Volume of the Proceedings was perfected chiefly through the mails, at eight cents per copy, and that of the Second Annual Volume, through the mails at twelve cents each, and when both were forwarded in one package, at the rate of seventeen cents, three cents was saved to the Association by shipping by express. I have learned very recently that a special rate on printed matter is in force by Express Companies, for the benefit of publishers and manufacturers, which reads as follows:—

"The following may be carried at ten cents for each 1 1-2 lbs. or less, and for single packages exceeding 1 1-2 lbs. one cent for each additional two ounces or fraction thereof, unless the graduated rate is less."

We have had no complaints, fortunately, from the members on account of failure to receive their annual copy during 1894. The delay in getting the matter to press for the Third Annual Volume was caused, in the main, by the apparent indifference of several contributors, from whom it was impossible to have the papers returned which had been forwarded upon request, after the last meeting, for sundry reasons. There should exist an imperative rule that all papers should be delivered to the Secretary after reading the same, and in no case should they be surrendered for inspection or modification.

FINANCES.

The current expenses of the Secretary's office for the past nine months, ending April 30th, 1894, amount in the aggregate to \$374.60. The vouchers for all debts contracted on account of the Association are in the hands of the Treasurer, who has very promptly and courteously paid all obligations assumed by the Secretary, on the first of each month. My duties in this respect have become a fraction more agreeable than formerly, as it has not been necessary to open a separate ledger and cash account, as all moneys were forwarded with a duplicate statement to the Treasurer, as soon as received; he in turn forwarding receipt for same.

An apology, perhaps, should be made for the liberty assumed by your Secretary for the digression in soliciting a few first-class

and legitimate advertisements, from reputable Pharmaceutical Associations, for the Third Annual Proceedings; who very gladly came to the rescue, more through friendship (I imagine) than any mercenary motive, to aid in liquidating our small indebtedness.

LEGISLATIVE COMMITTEE.

In the early part of the year, the Committee on Legislation, through its Chairman, Col. C. M. Woodward, issued 2,500 circular letters; being a set of Resolutions for the formation of Hospital Corps in the several States, and a petition for a uniform law governing the Medical Department of the National Guard of the United States.

Your Secretary was confided with the responsible and modest duty of distributing these letters throughout the several States. The task was a difficult and tedious one at best, since it was impossible to select a reliable agent in every State who would voluntarily carry out the wishes of the Committee. The routine adopted was as follows:

1st. An energetic and influential member was selected in each State, if possible, to whom one hundred copies or more were sent for proper distribution, through an Express Company, at printed matter rates, which amounted on the average to twenty-five cents per package. 2d. The Surgeon General and Adjutant General in each State, where no members resided, were forwarded packages of 25 and 50 through the mails, at the trifling expense of four and seven cents a package. 3d. Where the names of the Military Committee could be had in several States' Legislatures, packages of 10 and 25 were sent, at an expense of two and four cents per package.

CLERICAL WORK.

The rapid accumulation of printed matter and publications issued under the auspices of the Association, and received in exchange during the past year, has made it necessary for the Secretary to secure additional quarters than those already occupied for his private and professional use, hence for the past two months a small room has been provided at a nominal rental per month, wherein all records,

books, pamphlets, letters, files, etc., have been systematically arranged and are in safe keeping.

The correspondence and clerical work has more than quadrupled since the Second Annual Meeting, held in St. Louis, and I found it absolutely necessary to employ a stenographer at regular intervals, to assist and expedite the routine business of the Secretary's office. The average expense to the Association on this account has not exceeded \$5.00 per week, with few exceptions.

PROPERTY OF THE ASSOCIATION ON HAND TO DATE.

The following is an inventory of the property of the Association which has accrued since the last meeting, and does not include any minor articles in the Catalogue of 1893 (pages 77 and 78, Third Annual Volume).

- 275 Old Certificates of Membership.
- 200 New Certificates of Membership.
- 600 Blank Applications for Membership.
- 1 Letter Copying Book, 1,000 pages.
- 1 Electro of Official Button in exchange for Badge Electro.
- 3 Electros of Official Badge, Donation of Col. C. M. Woodward, Chairman Badge Committee.
- 3 Electros of Badges (forwarded to Chairman Com. Arrang'ts. Washington).
- 76 Electros of President Senn's Address.
- 2 Electros General Griffith's Paper.
- 1 Certificate of Organization (April 1894).
- 16 Yards of Badge Ribbon.
- 3 Yards of Diploma Ribbon.
- 1 Box of Red Seals.
- 1 Rubber Stamp, Address of Treasurer.
- 1 Rubber Stamp "Pay to order of Treasurer."
- 1 Rubber Stamp, name of Association.
- 1 Rubber Stamp "Printed Matter Rates."
- 1 Rubber Stamp "Treasurer's Address" (1893).
- 1 New Die in Seal.
- 1 Woodcut of Badge.

- 51 Mailing Tubes for Diplomas.
- 150 Address Wrapper Slips for Diplomas.
- 20 One cent Wrappers.
- 200 Express prepaid slips.
- 175 "B" Tension Envelopes 6x10.
- 45 Manilla Envelopes No. X, Printed.
- 245 Copies of Annual Proceedings, 1892.
- 143 Copies of Annual Proceedings, 1893.
- 90 Rosters of 1894.
- 20 Announcements for 1894 (Washington Meeting).
- 1,000 Major Carr's Reprints.
- 50 Letter Heads (Secretary).
- 1-3 Ream Japanese Linen Typewriter Paper No. 7 1-2.
- 1-2 Ream Typewriter Paper No. 10 "B."
- 12 Postal Cards, Size "C."
- 1 Perpetual Register of Members.

Very respectfully submitted.

E. CHANCELLOR,
Secretary.

May 1st, 1894.

Report accepted.

REPORT OF PUBLICATION COMMITTEE.

The Committee on Publication and Printed Matter begs leave to submit the following as a result of the work turned out, and the disposition of Printed Matter which has been contracted for on account of the Association by the Secretary, from August 1st, 1893 to April 30th, 1894:

- 250 Official Programmes (Chicago).
- 500 Certificates of Membership (Lithographed).
- 1,000 Blank Applications for Membership inserted in Proceedings, 1893.
- 1,000 Blank Applications for Membership, 1893.
- 1,200 Blank Applications for Membership, 1894.
- 500 Bill Heads (1893).
- 1,500 Letter Heads, with change in each 500.

- 1,500 Linen Letter Heads.
- 150 Copies Roster, interleaved with blank pages.
- 250 Copies Roster National Guard Surgeons 1893.
- 250 Insert Slips for Roster.
- 200 Insert Slips (Michigan).
- 100 Slips to Adjutant Generals, soliciting Annual Report.
- 100 Slips Advertising Rates.
- 100 Slips Advertising Contract.
- 100 Printed Postal Cards.
- 200 Cards (Price of extra copies Proceedings).
- 500 Manilla Envelopes No. 10, Printed.
- 500 Manilla Envelopes No. 6, Printed.
- 500 Tension Envelopes for 3d Annual Volume Proceedings.
- 1,000 Manilla Envelopes No. 10, Printed.
- 1,000 Large Manilla Envelopes, Printed, 3 kinds.
- 500 Small White Envelopes, Printed, 2 kinds.
- 500 Address Wrappers (Diplomas).
- 250 Mailing Tubes for Diplomas.
- 2,500 Circular Letters (Legislative Committee Resolutions).
- 500 Copies Proceedings 3d Annual Meeting 1893.
- 2,000 (12 page) Announcements 4th Annual Meeting.
- 300 Prepaid Express Labels.

In addition to the above report, we mention the following items received from the Treasurer:

- 500 Circular Letters.
- 500 Printed Envelopes.
- 500 Reprints of Circular Letter.
- 500 Bill Heads in Book form.

E. CHANCELLOR,
J. W. O'NEILL,
Committee.

Report accepted.

REPORT OF THE COMMITTEE ON THE NEW JOURNAL.

We regret that we have to appear before you at this meeting without having accomplished the object for which this Committee was constituted. At the same time, we want it understood that the

Committee is not responsible for it, nor have we lost interest or zeal in the project.

During the year Captain Woodruff consulted the chief officers of the Medical Departments of the Army, Navy and Marine Hospital services, and was given to understand that, whilst they would not commit themselves absolutely to the support of the proposed journal, they would, if the journal proved to be worthy of support, subscribe for a certain number of copies. The Marine Hospital Service, through its representative, objected to the word "Military" in its title (it having been decided by this Association in Chicago last year to name the journal "The Military Medical Journal, devoted to the interest of the Army, Navy, Marine Hospital and National Guard of the United States"). With this in view, we deemed it unwise to move in the matter of publication until this Association sanctioned a change of title. Furthermore, the Committee was handicapped by a resolution which gave to one publishing house the sole right to print the journal, and thus deprived the Committee of any option in the matter. The company, however submitted a proposition that if the money was advanced for the first issue of the journal by this Association, it could be started as a feeler, and would give an idea of how the journal would be received. The Committee did not favor this proposition, nor was there any authority for the use of the funds of the Association for any such purpose. The latter part of the year has been so marked by a depression in business and financial circles, affecting also in a great degree the profession, that the manager of this company stated recently to the Chairman of this Committee that he would advise us to wait until a brighter outlook made the scheme appear more feasible. The Committee has had offers from two or three other publishers, which are heretunto attached, but which we cannot ask you to consider until the resolution authorizing the publication of the new medical journal by the F. A. Davis Company is rescinded, and this we strongly recommend. The Committee is still enthusiastic over the establishment of a journal to be the official organ of this Association; indeed we regard it as a necessity for our instruction and improvement, and as a medium

for the interchange of thought and views upon subjects of mutual interest.

The Committee has received an offer from the Association of Railroad Surgeons to participate in a new publication devoted to the interests of both associations, but the majority of the Committee deprecate such a procedure and regard it as a sacrifice of our individuality. We desire to present the following resolution:

Resolved, 1st. That this Association favors the organization of a monthly journal devoted to the interests of the Medical Departments of the public services and of the National Guard.

2d. That this Association will subscribe for one copy per year of such a journal for each member of the Association, provided that the proceedings of its meetings are properly published, and provided that the annual subscription is not more than \$2.50 for each copy.

3d. That the Association authorizes the Committee on Medical Journal to put this work in motion; it being distinctly understood, however, that the Association assumes no responsibility, pecuniarily or otherwise, in the matter.

4th. That each member of the Association shall be furnished with a copy of the Transactions at the nominal price of fifteen cents per copy.

J. W. O'NEILL,
JAS. E. PILCHER,
E. CHANCELLOR,

Committee.

Capt. Standish:—Mr. President, I do not think we should put our name on the journal unless we can control the advertisements. The book will go into public use, and it is a question of great importance whether or not it is to be filled with advertisements of all kinds of quack medicines. We had better go without a journal than to have one under such conditions.

Capt. Pilcher:—Mr. President, Dr. Standish voices the sentiment of the committee. I think the credit of the journal may be safely entrusted to the committee and I move that the report be accepted.

Maj. Carr:—Mr. President, does the report of the committee contemplate an immediate publication of the journal?

The President:—The first number is to be in July.

Maj. Carr:—Mr. President, I wish to call the attention of the Association to one fact. We, of course, need a journal; but we ought to be able to float before we begin to swim. We are still \$497.00 in debt; we have gone through a bad year; we are now out of deep water, and there is a possibility that if the publication of the journal be discontinued for another year and the Secretary could be allowed discretion in the matter of advertisements, we could meet in Buffalo with \$2,000 or \$2,500 and have all debts paid. Then we could start a journal that would not be a failure.

I do not think it a proper thing to do at this time. We are an infant Association as yet, hardly able to crawl, and we should not begin to run. A member said to me this morning, "We are not building for to-day, for this year nor next year, but for the future, and let us be sure of our foundation before we reach out to put too much upon the foundation we have."

I sincerely trust that this will be deferred until the next annual meeting, and that these gentlemen having the matter in hand will be so backed financially that there shall be no failure.

Capt. Pilcher:—Mr. President, the point made by Maj. Carr was embodied in the resolution. The point was this: The Association has no financial responsibility for the cost of publishing the Journal. If there is a deficit the whole amount comes out of the pockets of the committee according to the wording of the resolution. The committee is entirely willing to shoulder that.

Maj. Carr:—Does the committee understand that this Association will lose from \$1,500 to \$2,500 by giving this work out of our hands. There is a reasonable promise of a profit of from \$1,500 to \$2,500 out of the publication of our proceedings, and this we would have to give to the com-

mittee, and the Association would get no benefit from the advertising. The Association can make this money, and it needs it.

Capt. Pilcher:—The question of profit certainly is an important one. This Association assumes no responsibility, pecuniary or otherwise. I am willing to agree to an amendment that all profits from the journal shall go to the Association.

The President:—For how long a time?

Capt. Pilcher:—Indefinitely—forever. It seems to me that the profits from the advertisements in the journal would be as much as any medical journal could get, if not more.

Major O'Neill:—Mr. President, the committee will be a creature of this Association; and, whilst we do the work, we expect this Association to control this journal. As to the advertising medium, the receipts from the advertisements would largely increase the treasury of this Association, and more than that, the circulation of the journal, and thereby the membership of our Association, would be enlarged. I think there would be no objection if this matter were put through this morning.

Col. Forster:—Mr. President, if the journal be published, the Transactions would cease to be published—the journal would take the place of our yearly Transactions. I think we had better get a little out of debt before we take this step, and I think Maj. Carr's judgment is one that we should follow. He has charge of the financial department.

Capt. Pilcher:—In this case the Association assumes no responsibility; and if there should be a deficit it would come out of the pockets of the committee.

The President:—I would like to make a suggestion, and that is to the effect that it would be exceedingly unwise to abandon the publication of the Transactions. If the journal should come into existence you can be provided with the Transactions at an expense of about 15 cents per copy, the

same price at which the Transactions of the railway surgeons were reprinted and furnished. Of course, the book would be unbound. That is the way our Transactions would be furnished—reprints.

Capt. Pilcher:—The committee will accept an amendment to that effect. [see clause 4th of the resolutions submitted in the report].

Major Carr:—One word more in reply to what Dr. Pilcher has just said. If there should be a deficit the Association would not be called upon to meet it. [Addressing Col. Chancellor]. If the proceedings should be published this year and you should be at liberty to accept advertisements as you might choose, would we not wipe out our deficit and have a profit at the Buffalo meeting? I call on you to answer?

Col. Chancellor:—That can be answered in the affirmative. My correspondence in the last three months warrants me in making the statement that we could very easily carry a number of legitimate advertisements, to amount to \$1,000 or \$2,000.

You have a grand committee (except the Secretary), and I would like to see this journal published. I believe as the matter now stands we can get a sufficient number of advertisements to net us at least \$1,000. If you will permit the one in charge to solicit advertisements at his own discretion, you can get any price you may ask. In fact, I stated to one concern in St. Louis that we would give one page opposite the reading matter in the back of the book at our price of \$150, and I was told that was very cheap; that I had better make it \$300.

The President:—Do you not believe that the financial result from legitimate advertisements in the publication of the journal would be at least the equivalent of, if not greater than, those from the publication of the Transactions?

Col. Chancellor:—I believe they would be more.

The President:—So that we would make a financial gain by publishing the journal?

Col. Chancellor:—Yes; you would get more advertisements, and far better prices for them than in *Transactions*. It has been decided that the journal is not to have any support from this Association. Am I to understand Major O'Neill as saying that the money accruing from the advertisements will go to the support of the journal?

Major O'Neill:—The profits will go into the treasury of this Association. If your *Transactions* net you so much, the journal will net you more, because you have twelve times the number of publications.

The President:—The journal can go on with no risk to the Association?

Capt. Pilcher:—The committee has offered to assume all pecuniary risk, the Association will receive all the profit. If the journal can earn \$2,000, it will all come to the Association.

Col. Chancellor:—My views are based on special correspondence with several editors of journals, who have modestly expressed themselves as making during a year something over \$2,000; one \$3,000; and another \$4,000; and I do not see why an energetic committee, represented by Major O'Neill, cannot make from \$2,000 to \$3,000 for us. Mr. President, in addition to that, it seems to me that practically, at \$2.50 a copy, we are simply paying ourselves back—the money changes through the medium of the journal right into the same channel.

Col. Forster:—I do not wish to be a kicker, but it seems to me that the *Transactions* are something that we can read with pleasure and keep on our shelves, while a medical journal we would look at and cast aside. I have for many years been one of the owners of the oldest journals in this country. You can figure it out, and you will find that it will cost something to establish a journal. In past years, I

have had to put my hand in my pocket to support one of the oldest journals in the country. It is only now that we have paid off the old debts. We are now just running even. I think we had better get on a good footing and stick to our Transactions.

Capt. Pilcher:—I do not think Col. Forster was in the room when the discussion arose on this question, and I will say for his information that the journal is proposed to be published now; this is the time that it could be made to pay. Then, in the second place, this Association assumes no pecuniary responsibility whatever. Then, too, its Transactions are to be published. We believe there is no question that if we have the proper co-operation of the members of the Association the journal will be a decided success. With the additional matter that it is hoped to include in the journal, it is believed that the value of the proceedings will be made much greater.

Col. Forster:—One word about advertisements. This matter has caused a good deal of discussion. The journal I have an interest in—and it is the only journal owned exclusively by the medical profession—is printed by contract, and the medical profession, the editors and board of managers, have supervision of the advertisements. But it is a constant grind to keep out those advertisements that are objectionable. I doubt whether we have a committee with time to spend in looking out for these things; they will creep in. Then I do not believe that we can get from the advertisements amounts that the committee seem to think, that is, advertisements that would not reflect discredit on us.

Capt. Pilcher:—I have one remark to make in reply to Dr. Forster; then I hope the question will be put to a vote. In the first place I have had a good deal of experience in the publication of a medical journal—not so much as Dr. Forster has had, possibly,—and I believe fully, as the result of my observation during the five years that I controlled such a periodical, that there is no question whatever of the

full and ample support of this journal by the advertisements and subscriptions. Whether the sanguine hopes of Dr. Chancellor will be realized or not, I can not say, but I think there will be a very considerable accession to the treasury of the Association during the next year if the resolutions are adopted.

General Cook:—Mr. President, the wording of that resolution is a little suspicious—"provided this Association assumes no responsibility, financial or otherwise." Does it not read something like that?

Capt. Pilcher:—Yes.

General Cook: The "otherwise" we want to assume. That is the responsibility we should have. Who is going to assume it if the Association does not? But I think we have medical journals enough in this country, and I am opposed to this one.

The President:—I would like to see incorporated in one of the resolutions, that is, the last one at least, in order that you may vote intelligently, a clause directing that each member of the Association be furnished a copy of the Transactions at an additional cost of fifteen cents. Would the chairman of the committee accept such a modification as that?

Major O'Neill:—Yes.

Capt. Ewing:—I understand that is in lieu of the \$2.00 a number.

The President:—I know it can be furnished for 15 cents.

Capt. Ewing:—That is in lieu of the \$2.00?

The President:—Yes.

Capt. Pilcher:—Mr. President, with regard to the point made by Gen. Cook, it is no more than justice to the committee, who assume the responsibility, to give them a cer-

tain amount of latitude. If the committee be at all trustworthy, if this Association entrusts its work to reputable medical men, it will certainly be safe to leave this matter in the committee's hands.

The President: The committee is but a part of the Association.

Major Carr:—To prevent further discussion, Mr. President, and to ascertain where we stand, I move that this whole subject be postponed until we meet in Buffalo.

The question being put, the result was announced—ayes, 41; nays, 9. The motion carried.

REPORT OF COMMITTEE ON NECROLOGY.

IN MEMORIAM.

COLONEL ROBERT B. JESSUP,

DIED NOVEMBER 9th, 1893, AT HIS HOME IN VINCENNES, INDIANA.

“— one by one they drop away,
As withered leaves they fall, and stray,
And disappear.”

The life of a good man needs no eulogy. Its best testimonial is that unspoken consciousness of his worth that lies treasured up in the memory and hearts of those who knew him.

Colonel Robert B. Jessup, Surgeon General of Indiana, and an honored member of the Association of Military Surgeons of the United States, was born in Redfield, N. Y., September 15th, 1828. On reaching manhood he went to Rising Sun, Indiana, and studied medicine. He entered Jefferson Medical College, Philadelphia, and graduated March, 1852, with honor. In July, 1853, he located at Vincennes, Ind., where he practiced medicine and surgery. July 14th, 1861, he was commissioned Surgeon of the 24th Indiana Infantry Volunteers, and left for the field.

He served as Regimental and Brigade Surgeon; and in the Battle of Shiloh, and subsequently at Fort Gibson, Champion Hills, Jackson, and during the Siege of Vicksburg, was Division Surgeon.

January 16th, 1889, he was appointed Surgeon-General, with the rank of Colonel, by Governor A. P. Hovey, of Indiana; an office he filled efficiently and with approval.

In the death of Colonel Jessup our Association has suffered no ordinary loss. He was a man of unusual attainments and superior talents—bending every energy to perfect himself in his chosen

profession. In National affairs he took a keen and active interest, and was a patriot in the true sense of the word. A good man, an



ROBERT B. JESSUP,
COLONEL AND SURGEON-GENERAL NATIONAL GUARD OF INDIANA.
DIED NOVEMBER 9, 1893.

honored citizen, and a valuable member of the Association of Military Surgeons of the United States, has gone to his reward.

GENERAL JOHN HENRY MURPHY,

DIED AT HIS HOME IN ST. PAUL, MINNESOTA, JANUARY 31ST, 94.

It has been said that if there be any who deserve to be held in special honor by mankind, that distinction may well be claimed by those who devote their lives and their talents to the relief of human suffering. In all ages and in all lands the healer has been honored as a universal benefactor; and amid the clash of contending armies, the Surgeon pursues his sacred calling undisturbed by all, for he knows no enemies but wounds, pain and disease. The upright, skillful physician is a power in the community; for amid all the changing scenes of life he is an honored man, even when his skill and wisdom is not required. He seems always to have had that power, too; for Homer said:

“A wise physician, skilled our wounds to heal,
Is more than armies to the public weal.”

Few citizens of the Northwest have gained greater prominence or wider recognition in a professional way than Doctor Murphy.

He belonged to the pioneer cordon of public men, who are recognized in that wonderful section of our country by untiring energy, but are now one by one giving way to a younger class of men, who are building upon the wide and intelligently-laid foundations of the sturdy pioneer.

General J. H. Murphy was born at New Brunswick, N. J., Jan. 22d, 1826. He came of military stock, for his father, Captain James Murphy, a native of Ireland, was an officer in the War of 1812. In 1834 Captain Murphy moved his family to Adams County, Illinois, settling on a farm near Quincy, where John grew to manhood with only such educational privileges as the common schools afforded. He early decided that he would study medicine, and after careful preparation entered Rush Medical College of Chicago, from which he graduated in 1850.

Dr. Murphy located at St. Anthony, Minn., where he continued in general practice until the war broke out. He responded promptly to the call of his country, and was made Surgeon of the 4th Regi-

ment Minnesota Volunteers, infantry. Many an old soldier to-day owes the extended lease of life to the skill and care of our lamented military associate. Disabled by a sunstroke at Vicksburg, he was compelled to resign, and for a short time remained



JOHN HENRY MURPHY,
BRIGADIER-GENERAL AND SURGEON-GENERAL OF MINNESOTA.
DIED JANUARY 31, 1894.

at home; but as soon as health was restored he rejoined the army as Surgeon of the 8th Regiment of Minnesota.

At the close of the war he removed to St. Paul, and actively engaged in the practice of medicine and surgery. Soon his abili-

ties were recognized, and for many years he was Chief Surgeon of all the leading railroads centering in St. Paul. He was elected President of the National Association of Railway Surgeons, a Vice-President of the American Medical Association, and for many years served as Surgeon General of the State of Minnesota.

The jolly fellowship which was such a pleasing and prominent characteristic of General Murphy opened the doors of every society that he cared to join; consequently he was prominently identified with many of the leading organizations, local and national. He was one of the most prominent Masons in his State, a well-known Odd-Fellow, Treasurer of the Old Settler's Association, a grand Grand Army Comrade, a genial wide-awake companion of the Military Order of the Loyal Legion U. S., and a member of numerous clubs, social and political. He was a public speaker of more than ordinary ability, and while he did not pose as an orator, ready on all occasions, yet he never failed when called upon to make a speech; and it was among his comrades and associates of the Army that he made his best. In public affairs General Murphy was distinguished by his unusual activity. An ardent party man, he gave his warm support to the candidates of the Republican party. For public affairs he cared nothing, and only consented to accept his party's nominations when he believed it his duty to serve his party, or the public, to advantage. In 1852 he was elected to the Legislature of the Territory; in 1855, a member of the State Legislature, and in 1857, a member of the State Constitutional Convention; and to each of these positions he brought a practical experience, at once so generally useful that he was a prominent figure in all these sessions.

This pushing world of money-getters holds too few of Surgeon Murphy's stamp. As a physician his services were ever at the disposal of all who needed them. No man, woman or child so poor that they could not command his professional labor at a moment's notice.

The brightest page in the career of our deceased member is that which records his military services to suffering soldiers. When the Nation was struggling for existence, he promptly placed at its disposal his professional skill and knowledge, and served it as faithfully and just as honorably as if he had fought with his sword.

(Signed).

FRED. W. BYERS,
JOSEPH K. WEAVER,
CHARLES ADAMS,

Committee.

Col. Alden:—Mr. President, as you know, I have been put down on the programme for a paper on Special Training of the Medical Officer, with brief notes on the course of instruction at Army Medical Schools, abroad and at home. Our time is passing and I feel sure that we shall not reach it. Then, too, papers become so extensive when we prepare them, that I would like to simply give expression of my own gratitude and that of the Medical Department of the Army for the interest and support that is given by this Association to the work of the Army Medical School. As you know, we are passing through a period of some uncertainty, to which I need not allude further. The support that has been given us is a source of gratification, and I assure you it is greatly appreciated.

The President:—Gentlemen, I now have the honor and the pleasure of presenting to you Surgeon General Sternberg, who has been unanimously elected President of the Association for the coming year.

Surgeon General Sternberg:—Gentlemen of the Convention, I thank you for the honor which you have done me, and I shall certainly do my best to promote the interest of this Association.

I should have been very well pleased had you seen fit to elect one of the surgeons of the National Guard, one who has been with the Association from the first. I am a newcomer, and I do not feel that I am entitled to the honor. Besides, I am very much occupied with the duties of my office, and it will be somewhat difficult for me to find the time which I think should be devoted to the Association. However, I will make every effort to do my duty; and with the assistance of the other officers, the Vice-President and the Secretary, I trust that I shall succeed, and that we shall have a successful meeting in Buffalo next year.

It is gratifying to see so many officers from a distance, medical officers of the Army coming on leave of absence from their posts and at their own expense, and officers of

the National Guard coming from their States—from great distances. If this interest be kept up in the future, it will certainly be a brilliant one for the Association.

General Burrell: —Mr. President, I move that a committee be appointed to draft resolutions expressive of the thanks of this Association to Colonel Senn for the efficient service he has rendered the Association during his incumbency of the office of President. I know I voice the sentiment of every gentleman in this room when I say that Colonel Senn is the Father of the Association, and we should certainly acknowledge that parentage in some formal manner.

The motion was adopted and the Chair appointed as such Committee General Burrell, Colonel Forwood and Dr. Gihon.

Capt. Horace E. Mann: —Mr. President, I move that the resolutions be engrossed, that they may be presented to Colonel Senn in proper form.

The motion was carried.

The President:—The report of the Executive Committee is now in order.

General Burrell, from the Executive Committee, made the following report:

REPORT OF EXECUTIVE COMMITTEE.

1st. The Committee resolved: That the Honorary Members who are still in active service, United States Army, United States Navy, and United States Marine Hospital Service, be transferred to Active List.

2d. That Surgeons who served with distinction in the late civil war (Federal or Confederate) be eligible to election as Honorary Members.

3d. That a Board of Censors be appointed, to whom shall be referred all applications for Membership. This Board to report their decisions to the Executive Committee preceding the Annual

Meeting in each year. And we would recommend that the applications now in the hands of this Committee be referred to this Board at this time. Our reason for this is, that these matters being of great and vital importance to this Association, they should not be hastily or lightly considered.

4th. Your Committee respectfully suggest that hereafter all Diplomas be "filled in" in old English text, as per samples accompanying this report.

5th. The Executive Committee deem it advisable to charge Members for the cost of their Diplomas (?) fifty cents each, which must in all cases accompany applications for same.

6th. A change in the By-Laws should be made, making it compulsory for Members to report promptly to the Secretary any promotion, resignation or retirement from the service, and that the prefix "Ex " be placed before the rank, or title of all retired officers.

7th. That the Secretary be authorized to secure such advertisements, to defray the expenses of publishing the Transactions, as he may consider wise; but such advertisements shall not be interleaved in the Transactions.

8th. Delinquents should be referred to a Committee for Delinquents (3) at the discretion of the Treasurer. He, however, has power to make such settlement as he deems best. This Committee should report within 30 days to the Treasurer and Executive Committee, who shall have power to dismiss the delinquent member.

9th. The Secretary was directed to destroy the remaining 200 Diplomas of the original Association.

10th. In Vol. III, 1893, on page 77, paragraph 2, Life Membership, the words "in this Association" on the 3d line after the word membership, shall be omitted, and the words "or this Association" shall be added after the word "service" in line 3.

11th. It is suggested that the Secretary be authorized to employ a stenographer, at as reasonable sum as in his discretion may be for the best interest of the Association.

12th. That the Secretary be permitted to continue the rental of space for the safe-keeping and care of all books, records, letters, files, etc.

13th. We would also recommend the Electros now in the possession of the Secretary, of the late Colonel Matthews, Captain Eggers, and the illustrations of Professor Senn, as well as that of General Griffith, be donated by this Association, as no further use to this organization and possibly valuable to them.

COL. C. F. W. MYERS, Chairman,

GEN. H. L. BURRELL, Secretary,

Executive Committee.

Report accepted—Resolutions adopted.

Capt. Clark:—Mr. President, I understand that the Executive Committee recommend that a Board of Censors be appointed to report at this meeting of the Association. I would like to inquire whether such a board could be appointed, and an examination made by it of applications for membership, so that it could report at this time?

Col. Woodward:—I will state that the committee will not have time to report at this session.

Col. Myers:—We reported upon all pending applications, except one which was rejected, and recommending the acceptance of all others. The board would not have time to report at this meeting.

Capt. Clark:—These are contributing and honorary members.

Col. Myers:—Yes. Active members are not passed upon by the committee.

General Burrell:—This Board of Censors that the Executive Committee recommends, it seems to me, is an important matter for the Association. Where the applications come in, either for honorary or contributing memberships, they can be referred to the Board of Censors, and that board can report to the Association at the first meeting thereafter. Then we shall have a check, and shall be in a better position to control entrances into the Association.

Col. Woodward:—I move that the report be adopted as read.

The motion was carried unanimously.

Col. Myers:—I now move that the Committee on Delinquents and Board of Censors be appointed at this time.

The President:—How are they to be appointed?—by the Chair?

Col. Myers:—Yes.

The President:—I would like time to consider the matter, and will announce the Committee and Board of Censors later.

Capt. Powell:—Mr. President, relative to the matter of the Red Cross which is borne on the badge, as I understand it, of the Military Association, I would say that I am a new member. But in a conversation with Col. Senn, at the Ebbitt House, the question of the status of that badge was brought up, and we spoke of the subject in connection with uniformity and the status it should have with reference to army officers on occasions of ceremony and matters of that sort, and I did not know whether it would be necessary to secure legislative enactment in order to warrant us in wearing that badge upon occasions of ceremony. Col. Senn may perhaps have something to say upon that subject. But I think it is a matter of some importance, because I attach value to that emblem, and I think its status should be fixed, and a prestige given it by national legislation.

The President:—That is a question which should be considered separately. The question now is upon the adoption of the resolutions which have been presented by your committee.

Capt. Ewing:—I move the adoption of the resolutions.
The motion was adopted.

Capt. Powell:—I brought this matter up because the body is about to adjourn, and I thought it was a matter of sufficient importance to have decisive action and some consensus of opinion expressed upon it by the Association.

Col. Almy:—Mr. President, Miss Clara Barton asked me to state that she was extremely sorry that she could not re-

ceive the Association as a body at her home, but that from half past twelve until four o'clock this afternoon she would be pleased to receive any individual members of the Association at the Headquarters of the National Red Cross Association, on 13th and F Streets, the old headquarters of General Grant. She also thanks you very much for the interest you have taken in the Red Cross.

Capt. Powell:—Mr. President, I move that a committee be appointed for the purpose of designating exactly what this badge shall be, and for the purpose of securing uniformity; and, further, that a memorial or petition be drawn to be presented to Congress.

Capt. Standish:—Mr. President, I move that the committee that presented the resolutions in regard to the Red Cross have charge of the Memorial, and be continued and authorized to exercise such other functions in regard to the matter as they may see fit.

The motion was carried.

The Chair announced the following appointments:

Committee on Delinquents.

General H. L. Burrell, Mass. V. M.

Major W. H. Egle, N. G. Pa.

Capt. H. E. Mann, Wis. N. G.

Board of Censors.

Major George Halley, N. G. Mo.

Major A. C. Girard, U. S. A.

Surgeon H. G. Beyer, U. S. N.

Dr. Gihon:—Mr. President, after listening to Major Egle's paper I think it the duty of this Association to express its appreciation of the work done by the Medical Department of the National Guard of Pennsylvania, and also to express our appreciation of the work done by the Medical Department of the National Guard as controlled by Colonel Read. I make that motion.

The motion was adopted.

Major Halley:—Mr. President, I move that a vote of thanks be extended to the citizens of Washington and to Major George Henderson, the Chairman of the Committee on Arrangements, for the courtesies extended the Association.

The motion was adopted.

Major Halley:—I move a similar vote to the members of the National Guard of the District of Columbia.

The motion was adopted.

Major Carr:—Mr. President, I move that the Secretary be allowed to insert such advertisements as he may see fit in our next annual proceedings.

Col. Forster:—I would like to express the hope that that be not done. That is a disfigurement of our Transactions, and we can get through without it.

The President:—That matter has been disposed of by the report of the Executive Committee.

President Sternberg appointed the various committees for 1894-5, as follows:

Executive Committee.

Col. Nicholas Senn.....	532 Dearborn Ave.....	Chicago, Ill.
Col. C. H. Alden.....	U. S. A	Washington, D. C.
Genl. Joseph D. Bryant.....	54 W. 36th St.....	New York City.
Genl. H. L. Burrell.....	22 Newbury St.....	Boston, Mass.
Col. C. M. Woodward.....	50 Chicago St. E.....	Tecumseh, Mich.

Literary Committee.

Genl. Joseph D. Bryant.....	54 W. 36th St.....	New York City.
Lt. Chas. M. Green.....	78 Marlborough.....	Boston, Mass.
Genl. James T. Priestly.....	707 E. Locust St.....	Des Moines, Ia.
Maj. Jno. Van R. Hoff, U. S. A....	Governor's Island.....	New York.
Surg. J. C. Boyd.....	U. S. N.....	Washington, D. C.

Committee on Legislation.

Col. Charles M. Woodward.....	50 Chicago St. E.....	Tecumseh, Mich.
Col. Louis W. Read.....	207 E. Main St.....	Norristown, Pa.
Col. Robert E. Giffen.....	Montgomery Block.....	Lincoln, Neb.
Col. Edward J. Forster.....	51 Massachusetts.....	Boston, Mass.
Col. Nelson H. Henry.....	143 E. 10th St.....	New York City.

Committee on Transportation.

Maj. Albert H. Briggs.....	267 Hudson St.....	Buffalo, N. Y.
Col. Francis J. Crane.....	27 Good Block.....	Denver, Col.
Col. E. L. B. Godfrey.....	400 Linden St.....	Camden, N. J.
Maj. George Henderson.....	817 T St., n. w.....	Washington, D. C.
Maj. Charles C. Carter.....	1807 Fifth Ave.....	Rock Island, Ill.

Committee on International Congress.

Col. Chas. R. Greenleaf, U. S. A.	36 New Montgomery St.	San Francisco, Cal.
Col. Nicholas Senn	532 Dearborn Ave.	Chicago, Ill.
Albert L. Gihon, Med. Dir	U. S. N.	Washington, D. C.
Genl. George Cook	16 Centre St.	Concord, N. H.
Maj. Geo. R. Fowler	302 Washington St.	Brooklyn, N. Y.

Committee on Laws.

Maj. A. C. Girard	U. S. A.	Ft. Sheridan, Ill.
Maj. William H. Egle		Harrisburg, Pa.
Capt. Myles Standish	200 Darmouth St.	Boston, Mass.

Committee on Finance and Auditing Accounts.

Lt. Franklin J. Kaufman	4 Hier Flats.	Syracuse, N. Y.
Maj. George Halley	800 Lydia Ave.	Kansas City, Mo.
Lt. George H. Halberstadt	218 Market St.	Pottsville, Pa.

Committee on Medical Journal.

Maj. J. Wilkes O'Neill	38 S. 19th St.	Philadelphia, Pa.
Capt. Jas. E. Pilcher, U. S. A.	Ft. Niagara.	Youngstown, N. Y.
Surg. Howard E. Ames	U. S. N.	Washington, D. C.

Committee on Publication and Printed Matter.

The Secretary <i>Ex-officio</i>	515 Olive St.	St. Louis, Mo.
Maj. Lawrence C. Carr	143 W. 7th St	Cincinnati, Ohio.
Capt. Chas. B. Ewing, U. S. A.	Jefferson Barracks.	Missouri.

Committee on Necrology.

Genl. George Cook	16 Centre St.	Concord, N. H.
Capt. L. A. LaGarde	U. S. A.	Denver, Col.
Capt. Thos. C. Clark	1110 South 3rd St.	Stillwater, Minn.

Committee on Badge and Seal.

Col. Chas. M. Woodward	50 Chicago St., E.	Tecumseh, Mich.
Col. B. J. D. Irwin, U. S. A.	58 Cedar St.	Chicago, Ill.
Maj. Harry E. Bradley	206 Wisconsin St.	Milwaukee, Wis.

Committee on Credentials.

Col. Nelson H. Henry	14 E. 10th St.	New York, N. Y.
Col. Charles H. French	109 Broadway.	Pawtucket, R. I.
Capt. Edward J. Meyer	1312 Main St.	Buffalo, N. Y.

Major Hoff:—I move that we do now adjourn.

The motion was carried, and (at 12 o'clock m.) the Convention adjourned to meet at Buffalo, N. Y., on the third Tuesday in May, 1895.

E. Chancellor,
Secretary.

CONSTITUTION AND BY-LAWS
OF THE
ASSOCIATION OF MILITARY SURGEONS
OF THE UNITED STATES.

PREAMBLE.

We, the undersigned, military surgeons of the United States, in order to promote and better the science of military surgery, do hereby agree to associate ourselves together and be governed by the following

CONSTITUTION.

Article I. The organization shall be known as "The Association of Military Surgeons of the United States."

Art. II. The Association shall meet annually, the time and place to be fixed at each meeting for the ensuing meeting.

Art. III. Thirty-five (35) members shall constitute a quorum for the transaction of business, but any number of members may adjourn from time to time.

Art. IV. The officers of this Association shall consist of (1) a President; (2) a 1st and (3) 2d Vice-President; (4) a Secretary; and (5) an assistant Secretary appointed by the Secretary; (6) a Treasurer and (7) an Executive Committee to consist of five (5) members to be appointed by the President at each annual meeting, and to whom shall be referred all executive business not otherwise provided for in this Constitution or By-Laws; (8) a Literary Committee of five (5) to be appointed by the President shall consist of two members of the National Guard and one each from the Army, Navy and

Marine Hospital Service, and of which Committee the President shall be the chairman ex-officio. It shall be the duty of this Committee to outline the work for the annual meeting in advance, making the necessary arrangements for the reading of papers and all literary work coming before the Association.

Art. V. The President, Vice-President, Secretary and Treasurer shall be elected annually at the annual meeting, and shall hold their respective offices for the term of one year. All officers elected by the Association shall hold their respective offices until their successors are duly elected and qualified.

Art. VI. The President shall preside at all meetings, give a casting vote when necessary and perform all other duties that custom and parliamentary usages may require. He may call special meetings at any time, as he may deem necessary.

Art. VII. In case of absence or inability of President to discharge his duties, the latter shall devolve upon the Vice-Presidents in the order of their election.

Art. VIII. The Secretary shall record the minutes and authenticate the proceedings of the Association, and at the close of his term of office shall lay before the Association a full report of his official work.

Art. IX. An Assistant Secretary shall be appointed by the Secretary at each annual meeting.

Art. X. The Treasurer of the Association shall collect all dues and pay all just claims against the Association from the funds of the Association, and he shall keep a record of all receipts and disbursements and at the close of his term of office shall lay before the Association a full report of all matters pertaining to his office.

Art. XI. The Association shall be composed of active, honorary and contributing members.

a. ACTIVE MEMBERS

shall consist of any commissioned medical officers of the United

States Army, Navy, Marine Hospital Service and National Guard or Volunteer Militia of the United States.

On application and presentation of the proper credentials to the Secretary of the Association, and on payment of the entrance fee they may become active members of this Association, and shall retain their membership and rank should they be honorably discharged from the service in which they were commissioned, and entitled to wear the uniform of the rank held at the time of such discharge from the service, upon payment of their annual dues.

Active members shall alone be eligible to office or shall vote at the meetings of the Association.

b. HONORARY MEMBERS

shall consist of men who have been in the Medical Service of the National Guard, or in the Medical Department of the Regular Army or Navy and Marine Hospital Service, or in that of the National Homes for Disabled Volunteers, or any distinguished military or naval surgeons from any part of the world, who from time to time may be unanimously elected. The names of the persons nominated for this honor shall be referred to the Executive Committee on the first day of the annual meeting before they are ballotted upon. They shall be entitled to all the privileges of active members, except to the holding of office and voting.

c. CONTRIBUTING MEMBERS.

Any person may become a contributing member who has in any way assisted in furthering the objects of this Association.

Members of this class shall be elected as prescribed for in Art. XI, Section B.

Art. XII. Any member of this Association who may be dismissed from the service for conduct unbecoming an officer and a gentleman, shall when proper proof is furnished the Secretary of this Association, be expelled therefrom and debarred from any further rights or privileges in the Association.

Art. XIII. All voting at regular meetings of this Association

shall be by representation; such representation shall be based on one vote each for each State, Territory, Army, Navy and Marine Hospital Service, in proportion of one vote for every ten (10) members or fraction thereof, in good standing, present at the time of voting, said vote or votes to be cast by a member or members present from each State, Territory, Army, Navy and Marine Hospital Service, designated by the members present from each State, Territory, Army, Navy and Marine Hospital Service.

Art. XIV. The initiation fee of the Association shall be five dollars (\$5.00) payable by each active and honorary member, in lieu of the annual dues for the first year. The annual dues shall be five dollars (\$5.00) due on the first of January of each year.

Art. XV. No amendment shall be made to this Constitution except by a three-fourths vote of all the members present at any annual meeting.

President's Annual Address.

ABDOMINAL SURGERY ON THE BATTLEFIELD.

BY N. SENN, M. D., PH. D., LL.D.,

President Association of Military Surgeons of the United States; President Association of Military Surgeons of Illinois; Surgeon General of the National Guard of Illinois.

Military surgery will always be regarded in the light of a specialty in surgery. The principles which govern its practice are the same as those which guide the civilian surgeon in his work, but the art is as widely at variance as the circumstances which demand its application. The science and art of surgery have undergone such radical changes during the last decade that nothing short of complete revolutionary changes in this special department will bring it up to the same enviable degree of perfection and usefulness as surgery in civil life. The military surgeon must keep abreast of the times, in order to secure for those placed in his charge the blessings to be derived from the application of the many important and valuable facts brought forward by modern investigation and research. Since the great war of the Rebellion and the more recent Franco-Prussian struggle, military surgeons have had only limited opportunities to make practical use of the great advancements which characterize modern aggressive surgery. For the good of humanity military surgery has been retarded by an epidemic of peace. Let us hope that the time is far distant when it will receive a new impetus from bloody conflicts on a large scale. As military surgeons, however, it is our duty to prepare for the future so that whenever called upon we will be prepared to meet the emergencies of recent warfare. The three great factors which will modify the practice of surgery on future battlefields will be: (1) Prevention of wound infection. (2) Conservative treatment of gunshot injuries of the extremities. (3) Prompt direct operative interference in the treatment of penetrating wounds of the large cavities, a field heretofore almost entirely neglected with the consequence that in a large proportion of cases death

resulted either from the injury *per se* or some immediate complication. All of these subjects present sufficient importance to claim the most serious attention of every member of the Association, but the scope is too extensive to be covered by an address which is necessarily limited as to time and which would require better opportunities for actual experience than have come within my reach for a thorough elucidation. It is my intention on this occasion, our fourth annual meeting, to discuss a few of the most important points of an entirely new departure in the service of the military surgeon of the future—viz: Abdominal Surgery on the Battlefield.

Since the close of the last great wars the inventive genius has been busily engaged in devising new weapons and other implements of destruction. The smokeless powder and the jacketed small calibre bullet have revolutionized modern warfare. Rapid firing at a greater range and certainty of aim will make the battles of the future of short duration, but the loss of life and the number of disabled and maimed will be greater than ever. The wounds that will come under treatment on the battlefield will present an entirely different aspect, and will demand different treatment than those inflicted by the old weapons. The new bullet, by virtue of its greater velocity and penetrating power, will either produce speedy death or the injury which it inflicts will be more amenable to successful treatment because it produces less contusion of the soft tissues and splintering of bone than the heavy leaden bullet used in the past. Beck, Bruns, Delorme, Langier, Roget, Bardeleben, Helferich, Kocher, La Garde, Griffith, and others have made careful experimental researches concerning the effect of the new projectile upon the different tissues at variable distances, but this subject is not exhausted and further studies must be made to furnish the final positive demonstrations.

During the beginning of our Civil War, our infantry was supplied with the old Springfield muzzle loader. The bullet was conical and had a diameter of fifty-eight hundredths of an inch and a length of about one inch, and was fired at a velocity of about one thousand feet a second. The Krag-Jorgensen and similar small calibre guns are made to fire a jacketed bullet about an inch and one-third in length and only thirty hundredths of an inch in diameter. The

modern bullet consists of a jacket of thin steel, or of German silver, filled with lead and nickel-plated. Its construction is such that it is but little deformed even in striking the hardest substances and as the smokeless powder imparts to them a velocity double that of the old bullet, it is less liable to deviate from its original course and produces much less laceration of soft parts and comminution of bone. The wounds inflicted resemble more closely incised than lacerated wounds. The old bullet produced more laceration and shock than the new missile. The new bullet inflicts wounds which resemble the injuries caused by the old weapons within a distance of 350



First aid from behind the line of battle. Looking toward the first dressing station.*

*The field scenes were photographed by Captain Ives and Lieutenant Newgarden at Fort Sheridan.

yards, and as most of the wounds will be produced at a greater distance the surgeon will have to deal with injuries resembling incised or punctured wounds. The bullet will also be less liable to carry before it infected foreign substances and to lodge in the body, consequently the wounds will be less liable to primary infection and consequently, better adapted for successful conservative treatment. In so far as pertains to the efficient treatment of wounds of the extremities all are agreed as to the best course of treatment to be pursued. Rigid antiseptic and aseptic measures will be carried out at

the first dressing station and rest will be secured by extemporized means of immobilization and the patients sent to the rear with a message informing the hospital surgeons whether or not the first dressing must be changed or whether more efficient antiseptic measures are required, or complications to be treated. Very little has been done so far in the way of aggressive surgical interference for heroes who fell mortally wounded in the line of battle in the defense of their country, their ruler, their families, their homes and their rights. The time has come when in case of war adequate provisions should be made on the field of battle near the fighting line for the prompt treatment of perforating gunshot wounds of the abdomen. It is difficult to conceive how many valuable lives have been sacrificed on the field of battle during the innumerable bloody conflicts recorded in the history of the world which now could be saved by prompt and efficient surgical interference. Thousands of lives have been lost from internal hemorrhage alone which at the present time could be saved by abdominal section and resort to direct means of hemostasis. In future wars it should be made the sacred duty of every civilized nation to do all that modern surgery can accomplish in the treatment of perforating gunshot wounds of the abdomen at the first dressing station, located as near as possible to the fighting line. Every soldier who has been in active military service can recall instances where comrades dropped in the ranks with a mortal bullet wound of the abdomen, who lived for several hours and died from hemorrhage, often forgotten and uncared for in the excitement of the conflict. Justice, patriotism, humanity and the present status of abdominal surgery demand that in future wars a well regulated hospital corps shall render efficient first aid, promptly convey the severely wounded to the first dressing station where they can receive further surgical aid, and where, if die they must, the last hour of their life shall be peaceful, surrounded by those who will add to their comfort and administer words of consolation as the immortal spirit leaves the maimed body for its eternal resting place. It is my firm conviction that military surgeons will follow the precepts and practice of the progressive and aggressive civilian surgeons in the treatment of visceral injuries of the abdominal cavity on the first opportunity

that presents itself. To permit a wounded soldier to die from hemorrhage of a wound of one of the abdominal organs, which otherwise would not prove a source of immediate or remote danger, is in conflict with the duties of the country to its defenders, and a reproach upon modern surgical practice on the battlefield.

Two leading indications will present themselves in the treatment of penetrating gunshot wounds of the abdomen. (1) Arrest of hemorrhage. (2) Direct treatment of visceral wounds.

The timely treatment of visceral injuries of the abdomen on the battlefield will require improved facilities for transportation of the wounded and an adequate hospital corps force to render the first aid and transport the wounded to the first dressing station and later to the field hospital. In the regular army a faithful effort is now made to build up an efficient and well-equipped hospital corps. The Surgeons of the National Guard should use their influence in securing uniform legislation in every State of the Union looking toward the organization of a similar special military service. So far but little has been done in this direction. The hospital corps service should be modelled as closely as possible after that of the regular army. The members of the corps should, of course, be non-combatants and well instructed in their special work. The members should at least possess a good common school education and sufficiently familiar with minor surgery to act as trustworthy assistants in emergency operations. During the beginning of an engagement the hospital corps under the command of the officer in charge is stationed at the ambulance station in some protected locality and sufficiently to the rear of the fighting line to be out of range of the small arm bullets. From here the members set out with litters and supplied with the necessary articles to render the first aid. Each member should be able to make a quick and reliable diagnosis between shock and the complexus of symptoms resembling shock produced by internal hemorrhage. In shock the maximum symptoms appear immediately after the receipt of the injury while in hemorrhage the symptoms gradually increase in intensity with the loss of blood. This distinction has an important practical bearing as the administration of stimulants increases the danger from hemorrhage while it miti-

gates the symptoms of shock. The treatment of internal hemorrhage should receive attention on the part of those who first come in contact with the wounded. The patient must be kept in the recumbent position and should be cautioned not to make the least muscular exertion. The first aid in such cases should consist of measures best calculated to retain within the blood vessels as much blood as possible and to place the visceral wound in the best possible condition for the formation of a thrombus.

I know of only two indirect means to accomplish these objects, viz.: (1) Constriction at the base of the extremities. (2) Pressure



First Dressing Station.

over the seat of injury. Constriction at the base of one or more extremities sufficiently firm to arrest both the arterial and venous circulation will preserve the blood contained in the extremity at the time the constrictor is applied and will lighten the heart's action to an extent corresponding with the amount of blood excluded in this manner from the general circulation. In this manner a sufficient amount of living blood could often be retained in the body to carry on the functions of life after the cause of bleeding has been removed by direct hemostatic measures. The wounds of entrance and exit are covered with an antiseptic pad. The suspenders of the wounded

soldier, the gun-strap, the belt, or strip of his clothing could be used to make the adequate number of circular constrictions. Direct pressure over the wounded organ will diminish its vascularity, and bring the tissues of the tubular wound in contact, conditions which will favor spontaneous arrest of hemorrhage by the formation of a blood-clot. Pressure to meet these indications can be made by applying over the wound of entrance protected by an antiseptic pad a compress composed of the canteen, the cartridge box or an article of clothing and held in place by the belt, the gun-strap, suspender or strip of clothing. After such temporary aid the patient should be transported as quickly as possible from the fighting line to the ambulance station and from there to the field hospital. For obvious reasons the first dressing station is not the place for operations upon any of the abdominal organs.

The ever varying position of the line of battle, the inadequate supply of instruments and dressing materials as well as the exposure more or less to the dangers incident to active warfare prohibit any operations requiring abdominal section in such close proximity to the danger line. Patients suffering from penetrating wounds of the abdomen should be transported on the same litter in the ambulance from the battlefield to the field hospital, as gently and as quickly as circumstances will permit. The new weapons will make it necessary to establish the first dressing station, and the field hospital at a more distant point behind the fighting line than heretofore. The first dressing station should be in some protected place, in a ravine or behind a building, while the latter should be in a place farther in the rear entirely out of reach of the infantry fire and in a place protected against the fire of artillery. While I am extremely anxious to impress upon the members of this Association the importance and justifiability of abdominal section upon the battlefield as a life-saving operation I am equally conscious of the responsibility which accompanies the teaching and practice of such a new departure in military service. The indiscriminate adoption of such a practice by all military surgeons would in all probability increase rather than diminish the mortality of penetrating wounds of the abdomen. Abdominal section under such trying circumstances requires an unusual degree

of moral courage and special skill. Surgeons to whom such a task will be assigned must be thoroughly prepared for their work.

The correct diagnosis and proper treatment of gunshot wounds of the stomach and intestines require a degree of skill and dexterity which can only be acquired by operations on the cadaver and experiments on the lower animals.

An accurate knowledge of the anatomy and topography of the abdominal organs is an essential prerequisite to the student of abdominal surgery. The necessary manual dexterity can only be acquired by actual work and practical demonstrations. No amount of reading and hearing will bring the necessary skill. Even the minutest descriptions of the details to be observed and applied in the diagnosis and treatment of gunshot wounds of the abdomen are utterly inadequate to prepare a surgeon to interpret correctly the symptoms and signs presented by penetrating gunshot wounds of the abdomen, or to meet the often unexpected emergencies in their treatment. The establishment of the Army and Naval Medical Schools is a source of congratulation not only to the respective services of the Government but also to every surgeon of the National Guard. To them we shall look foremost for the needful advancements in military surgery. They should and will be the authoritative exponents of the much needed improvements of surgery on the battlefield. I trust they will in their curriculum include instruction that will prepare in each branch of the medical service men who will be competent to perform the most difficult operations upon any of the abdominal organs at a moment's notice with the simplest instruments, with few assistants and the most primitive surroundings; with such a nucleus abdominal surgery in military practice will soon become a favorite subject for discussion and the battlefield of the future will bring new laurels upon the many achievements of modern surgery.

Operative courses on the cadaver are valuable and useful, but they never can take the place of experiments on the living animal in acquiring a practical knowledge of abdominal surgery. This is more especially true in reference to the required manual dexterity in the surgical treatment of internal hemorrhage and wounds of the

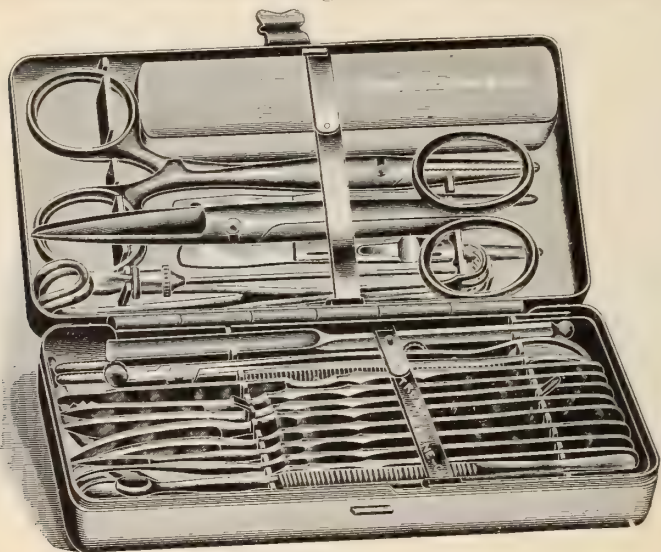
abdominal viscera. A certain amount of experimental experience is absolutely required in the preparation of the surgeon for this kind of abdominal work which requires not only courage, good judgment, and a thorough knowledge of every step in diagnosis and treatment, but also a certain manual dexterity which can not be acquired in any other way. We can hardly hope that every military surgeon will acquire the necessary qualifications for such work. Nor is this necessary. Abdominal surgery on the battlefield will constitute only a small part of the work required of the surgeons during an engagement. Many penetrating wounds of the abdomen will prove speedily fatal. Those cases which survive the immediate effect of the injury



Ambulance Station.

and are in a condition to justify abdominal section will be comparatively few. The abdominal work should be done by surgeons who possess special skill and experience. At least one surgeon in every brigade should be stationed at the field hospital whose duty it should be to superintend the preparations and perform the operations. The most successful laparotomists need the fewest assistants and instruments. In military practice their example should be followed. During an engagement on a large scale the surgeons and members

of the hospital corps are always overtaxed, by urgent demands from all directions. Excitement and confusion reign everywhere. The deafening roar of the artillery, the rattling of the infantry, the commands of the officers, the groans of the wounded, the rumbling of the ambulances are well calculated to excite curiosity and to deviate the novices from the strict line of duty. It is under such circumstances that the surgeon who is to perform the most difficult operations in surgery must be in full possession of all of his mental faculties if his work is to save many of the lives placed in immediate jeopardy from the effects of the enemy's bullets. Ample preparation must be made beforehand, otherwise valuable time is lost and many lives sacrificed that might be saved by prompt action. With two skilled assistants, an assistant surgeon, and a member of the hospital



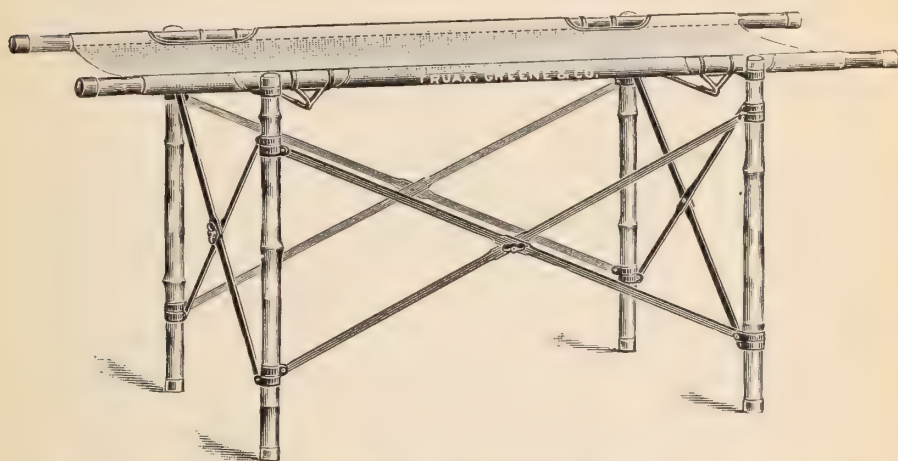
Author's Emergency Pocket Operating Case.

corps, a laparotomy for gunshot wound of the abdomen can be made quickly and successfully provided careful preparations have been made beforehand.

PREPARATIONS FOR OPERATION.

The field hospital will be either a building used temporarily for hospital purposes or a hospital tent. In the former case the operat-

ing room should be cleared of all furniture and draperies, the floor, walls and ceiling sprinkled with a strong solution of carbolic acid or corrosive sublimate. A portable sheet-iron stove heated by coal oil will answer the purpose of heating the room and sterilizing the in-



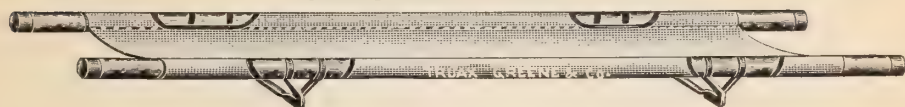
Author's Litter Operating Table.



Author's Field Operating Table, Folded.



Operating Table and Litter, Folded.



Author's Litter. Weight, $7\frac{1}{2}$ pounds.



Litter, Folded.

struments and the water used during the operation. Two large tin pails, one for cold and the other for hot sterilized water and three large wash-basins of granite ware, and a dipper of the same material will answer the purpose of handling the antiseptic solutions and

sterilized water. Sterilized gauze should take the place of sea sponges. The instrument case that I devised some time ago and which I have called the emergency pocket operating case, contains all the instruments needed and as it contains needles and the necessary suture material everything in the way of instruments, ligatures and sutures can be rendered absolutely sterile by placing the case for fifteen minutes in boiling water to which has been added one per cent of carbonate of soda. The case is then taken out and after pouring out the water it is placed on the stove until its contents are dry, when they are placed upon an extemporized table covered by an aseptic towel. The hands of the operator and assistants are in the meantime rendered aseptic in the usual manner. During the operation the instruments are to be cleansed as often as necessary in sterilized water and laid upon the towel until needed by the operator. The best operating table will be the litter operating table. This table is composed of the litter upon which the patient is brought to the hospital placed upon the extension frame. Folding camp-stools will answer the purpose of tables for the wash-basins and instruments. Bricks, stone, sand or earth can be heated on the stove and will answer an excellent purpose in supplying the extremities with artificial heat during and after operation. The necessary stimulants, alcohol, camphor, nitrite of amyl, ammonia and strychnine should always be on hand to counteract the symptoms of shock. One assistant administers the anaesthetic while the other hands the instruments, handles the gauze sponges and otherwise assists the operator. A number of gauze compresses must be kept in readiness. During the operation sterilized water is used exclusively. If flushing is indicated this can be done by pouring warm water from a basin. During the operation the patient should be placed in a slightly inverted position for the purpose of increasing the blood supply to the vital organs and diminishing the tendency to prolapse of the intestine.

OPERATION.

In the future the differential diagnosis between penetrating and non-penetrating wounds of the abdomen will be attended by less uncertainty than in the past, as in most instances the bullet will pass through the body in a straight line and the wounds of entrance and

exit will indicate whether or not the abdominal cavity has been invaded. Prolapse of the abdominal organs, owing to the smaller size of the bullet wound, will be less frequently observed. If an operation is decided upon and the patient suffers from shock, one-twenty-fourth of a grain of strychnine should be given subcutaneously before the administration of the anaesthetic. No time should be lost in removing the patient's clothing, as such a procedure would tend to increase the hemorrhage and add to the existing shock. The boots or shoes should be removed and artificial heat applied to the feet, the abdomen laid bare, rolling pants and drawers downward sufficiently far to expose the pubes and the remaining clothing upward far enough to bring into view the costal arches on both sides. After the patient is fully under the influence of the anaesthetic, the abdomen is rapidly disinfected by washing with warm water and potash soap, shaving, washing with a 1:1,000 solution of sublimate and finally with alcohol or ether. The clothing in the vicinity of the abdomen is then covered with dry aseptic towels. Unless contraindications exist, the abdomen is opened on the median line as this incision affords the most ready access to the injured organ. In perforating wounds of the abdomen, profuse hemorrhage is more frequently of parenchymatous and venous than arterial origin. Gun-shot wounds of the liver, spleen, kidneys, and the mesentery give rise to profuse and often fatal hemorrhage. After opening the peritoneal cavity it is often very difficult to find the bleeding points, as the blood accumulates as rapidly as it is sponged away, and it becomes necessary to resort to special means in order to arrest temporarily the profuse bleeding sufficiently to find the source of hemorrhage. One of two resources should be employed: (1) Digital compression of the aorta. (2) Packing of the abdominal cavity with a large number of gauze compresses. Digital compression of the aorta below the diaphragm can be readily made by the assistant introducing his hand through the incision, which in such cases must be larger than under ordinary circumstances. Compression of the abdominal aorta immediately below the diaphragm will promptly arrest the hemorrhage from any of the abdominal organs for a sufficient length of time to enable the surgeon to find the source of the hemorrhage and carry

out the necessary treatment for its permanent arrest. Hemorrhage from a perforated lacerated kidney may demand a nephrotomy. If an injury of this nature is associated with a wound of the abdominal cavity the organ will probably be removed by laparotomy. If this method is employed the wound of the parietal peritoneum is sutured, and, if necessary, drainage established by a counter opening in the lumbar region. A similar wound of the liver is cauterized with the



Field Hospital.

actual cautery, sutured or tamponned with a long strip of iodoform gauze, one end of which is brought out of the external wound.

At the last meeting of the German Congress of Surgeons, von Bergmann spoke strongly in favor of the suture as a haemostatic agent in the treatment of wounds of the liver. He asserted that Glisson's capsule offered enough resistance to the sutures, while a number of other surgeons gave it as their opinion that the sutures would tear through. A round needle should be used invariably in suturing such a vascular organ as the punctures are less liable to bleed than if the ordinary surgical needle is used. It appears to me that on the battlefield the tampon should be relied upon in arresting hemorrhage from wounds of the liver, as its use requires less time, and it serves at the same time the useful purpose of an efficient capil-

lary drain. The use of the cautery is of course not to be thought of in the treatment of tubular wounds and its employment will consequently be restricted to wounds of the surface of the organ or its lower border. A wound of the spleen, if the hemorrhage can not be arrested by the antiseptic tampon, necessitates splenectomy as the tissues of this organ are too fragile for the successful employment of the suture as a haemostatic agent. Hemorrhage from the pancreas must be controlled by antiseptic tamponnade, as this organ is not sufficiently accessible to permit ligation or suturing without too extensive eventration and too great a loss of time. Very troublesome hemorrhage is often met with from wounds of the mesentery. The mesenteric veins are comparatively large in size, and the tissues surrounding them are not well adapted to effect spontaneous arrest of hemorrhage. When multiple perforations of the mesentery and viscera of the stomach and intestines are the source of hemorrhage, it is a good plan to pack the abdominal cavity with a number of large gauze compresses, each secured by a strip of gauze which should be brought out of the wound to facilitate their removal, and as a safeguard against losing or forgetting them in the abdominal cavity at the completion of the operation. The compresses make sufficient pressure to arrest parenchymatous oozing as well as venous hemorrhage if they are placed at different points against the mesentery and between the intestinal coils. The compresses are removed one by one from below upwards and the bleeding points secured as fast as they are uncovered. The ligation of mesenteric vessels, both arteries and veins, should be done forceps, or the ordinary aneurism needle, is the most useful instrument for this purpose. Catgut should never be relied upon in tying mesenteric or omental vessels, as this material, for several reasons which it is not necessary to mention here, is greatly inferior to fine silk. The omentum and mesentery must be tied in fine sections, the ligatures firmly drawn, and if a part of either of these is excised the incision should be made at least half an inch from the ligatures to prevent their slipping. Troublesome hemorrhage from a large visceral wound of the stomach and intestines is best controlled by hemming the margin of the wound with fine silk. If hemorrhage

is profuse from any of the causes which have been enumerated, this must be attended to before anything is done in the way of finding or suturing of the visceral wounds.

TREATMENT OF VISCERAL WOUNDS.

Clinical experience and experimental research have demonstrated beyond all doubt that visceral wounds of the stomach and intestines large enough to give rise to extravasation are with but very few exceptions mortal injuries. The danger arising from such wounds is, of course, much greater when the organ injured is in a condition of active physiological function; on the other hand, if the organ is in a state of rest extravasation is less liable to occur and consequently a greater possibility of spontaneous healing of the visceral wound.



Laparotomy on the Battlefield.

For this reason we find numerous records of recovery from pistol-shot wounds of the stomach, this organ having been empty at the time the injury was received. More numerous are the instances in which patients have recovered from perforating wounds of the abdomen in which the clinical symptoms did not indicate the existence

of any visceral injuries. I have been convinced for years that a bullet passing through the abdominal cavity does not produce visceral injuries as constantly as we have been taught to believe. I made fourteen experiments on the cadaver for the purpose of ascertaining the comparative frequency of visceral injuries in perforating wounds of the abdomen. In four of these experiments the bullet passed through the abdominal cavity in an antero-posterior direction without producing any visceral injury which would require surgical interference. In two out of six cases of penetrating gunshot wound of the abdomen that have come under my own observation laparotomy revealed the absence of visceral wounds. Laparotomy should not be performed simply because a bullet has entered the abdominal cavity, but its performance should be limited to the treatment of intra-abdominal lesions which, without operative interference, would tend to destroy life. In regard to the direction of the bullet, it may be said that if it has crossed the abdominal cavity in an antero-posterior direction at or above the umbilical level, the stomach and intestines may have escaped injury, while if it has passed from side to side or obliquely at a point below the umbilicus, it is not only almost certain that it has injured the intestines, but it is almost equally certain that it has produced from three to sixteen perforations.

The treatment that has been advised for the arrest of hemorrhage from the liver, spleen, pancreas and kidneys is about all that can be done for gunshot wounds of these organs. A more complicated and difficult task confronts the surgeon in the treatment of visceral wounds of the gastro-intestinal canal. If the location of the wound of entrance and direction of the bullet indicate the existence of a wound of the intestinal canal below the ileo-caecal valve, a speedy and positive diagnosis can be made after the patient is under the influence of anaesthetic, by insufflation of air *per rectum*. If this test yields a positive result, median laparotomy is to be performed at once, the wounds located by the same test and sutured. In the majority of cases two wounds will be found. If the small intestines are out of range of the track made by the bullet, further search for perforations is not only unnecessary, but harmful. Careful toilet

of the peritoneal cavity in the vicinity of the intestinal wounds by flushing or mopping is always necessary in such cases. If considerable extravasation has taken place, drainage should be provided for in addition. If the direction of the track of the bullet is such that it is probable that the small intestines are injured the abdomen should be opened at once, the lowest perforation located by rectal insufflation. When this has been done the air from the intestinal canal below the perforation should be removed as far as possible, when the insufflation is made from this point in an upward direction in search of additional perforations. If additional perforations are found, the intervening portion of intestine is emptied of air, the first perforation closed by suturing, and the process repeated until the entire intestinal canal has been tested by this method. Extensive eventration is prevented by reducing the part of intestine examined and treated as fast as the exploration is made.

By adopting this method the surgeon guards absolutely against leaving an undiscovered wound which has in so many instances been the immediate cause of death after laparotomy for gunshot wounds of the abdomen. If the wound of entrance and direction of the bullet point to the probable existence of a wound of the stomach, insufflation of the stomach through an elastic stomach tube will prove a most valuable diagnostic measure, and is occasionally the only way by which a second perforation of this organ can be detected, as is the case if it involves the smaller curvature or the posterior wall. The suturing of the wound is done in the quickest possible time and in the simplest manner. If bleeding has not ceased it is arrested by hemming the margins of the wound by a continued suture of fine silk.

The closure of the wound is effected by Lembert stitches, about six to the inch, which must include a few fibers of the firm sub-mucous coat on each side. Trimming of the contused margins is superfluous. An ordinary sewing needle and fine-braided silk should be used in suturing the visceral wounds. As a rule the line of suturing should be made transversely as stenosis is less liable to occur and the vascular supply to the parts coaptated is less likely to be compromised than would be the case if the wound is closed in a direction parallel to the long axis of the bowel. Enterectomy and circular

suturing may become necessary if the wound involves the mesenteric side of the bowel, or if a number of wounds are found in close proximity. In such cases extravasation during the operation is prevented by constricting the bowel on each side with a strip of gauze passed through a small button hole in the mesentery close to the bowel, made with a pair of hemostatic forceps and tied sufficiently firm to prevent escape of intestinal contents. If any part of the sutured bowel presents conditions that might endanger the healing process, it should be covered by an omental graft. The operation must be completed as rapidly as possible, hence the toilet of the peritoneal cavity and suturing of the external wound must be completed with as little delay as is compatible with the safety of the operation. A single row of sutures including all of the tissues of the abdominal incision, will answer the purpose in closing the external incision. The omentum must invariably be drawn down sufficiently far to cover the abdominal incision, as this procedure is best calculated to prevent subsequent adhesions of the remaining abdominal organs to the inner surface of the external incision. If the patient has lost a dangerous amount of blood a saline intravenous infusion will often prove the means of preventing death from this source. The solution should be prepared by dissolving in a quart of warm sterilized water the requisite quantity of pure sodic chloride, kept in readiness for this purpose. The after-treatment must have in view mainly to meet the symptoms of shock caused by the injury and the operation. Rest, external dry heat, subcutaneous injections of strychnine and alcoholic stimulants will meet this indication most satisfactorily. Absolute diet for the first three or four days with rectal alimentation constitute an essential part of the after-treatment. A saline cathartic should be given as soon as tympanites makes its appearance regardless of the length of time that has intervened since the operation. I am firmly convinced that abdominal surgery has a great future in military practice. It is the duty of the proper military authorities to make ample provision for initiating a well-matured plan of procedure calculated to save occasionally a life upon the battlefield in cases heretofore beyond the reach of surgery. The nations that spend millions of dollars annu-

ally in perfecting their methods of warfare should not remain unconscious of their full duty to the wounded of future conflicts, and one of the most urgent demands of modern surgery will be to extend the recent achievements of abdominal surgery to the battlefield. I am painfully conscious of the fact that the professional military surgeons will regard the suggestions that I have made in this direction as immature and imperfect, but if I have succeeded in awakening their interest in this matter the principal object in the preparation of this address will be realized.

In conclusion permit me to formulate the salient ideas on this subject in the following conclusions:

1. Abdominal surgery will extend its life-saving work to the battlefield of future wars.

2. The treatment of dangerous internal hemorrhage and visceral wounds of the abdominal organs by laparotomy in military practice is a justifiable and legitimate procedure, which merits the earnest consideration of every military surgeon and deserving of the most serious attention of the proper military authorities of all civilized nations.

3. The first aid to those suffering from gunshot wound of the abdomen and in which life is threatened by hemorrhage should consist in compression over the injured part and auto-transfusion by circular constriction at the base of one or more extremities.

4. Operative treatment of gunshot wounds of the abdomen should be resorted to promptly in appropriate cases, and for this purpose the wounded should be transported from the fighting line to the field hospital with great care and without delay.

5. The field hospital should be equipped with the necessary instruments and outfit to perform aseptic operations.

6. After opening the peritoneal cavity by a median incision temporary haemostasis can be secured for the purpose of arresting dangerous arterial hemorrhage by digital compression of the aorta below the diaphragm and venous hemorrhage or parenchymatous bleeding by sponge compression.

7. Permanent haemostasis must be secured by ligature or aseptic tamponade.

8. Visceral wounds of the liver and pancreas are amenable to successful treatment by suturing, aseptic tamponnade, or actual cautery.

9. Wounds of the spleen and kidney, if not amenable to the same treatment, may require removal of the injured organ.

10. Wounds of the stomach and intestines large enough to permit extravasation with very few exceptions result in death, and should therefore be subjected to direct operative treatment before serious complications set in.

11. Distension of the stomach and colon by insufflation of air before laparotomy and of the small intestines through one or more perforations after the abdomen has been opened, is a valuable diagnostic test.

12. Wounds of the stomach and intestines can be quickly and safely closed by one row of sero-muscular sutures including a few fibers of the submucous fibrous coat.

13. The after-treatment should consist of such measures as will most successfully combat the symptoms of shock and secure rest for the injured organ.



Pannier and Dressing-Case. Weight including contents, 70 pounds.

Symposium on Transportation of the Sick and Wounded.

TRANSPORTATION OF WOUNDED IN WAR.

By MAJOR CHARLES SMART,
Surgeon, U. S. Army.

In writing history it is necessary to begin at the beginning, thereafter following our subject along the stream of time until we reach either the end of its course or its present anchorage; but the beginning of our present subject is lost in the haze of the distant past. In the earliest dawn of history we find men fighting; and battles, no doubt, were fought even in the primitive days. The history of the human race is in fact a history of battles and their results. But history had no eyes for those who dropped out of the struggle; seldom are we told of the wounded. Nevertheless, we must credit these old time warriors with sympathies which led them to care for their wounded, so that our subject finds a beginning as far back and as undefined as history itself.

We may assume that slaves, servants, companions-in-arms, friends or relatives cared for the fallen as soon as the exigencies of war permitted, and that the methods differed with race and nation, mode of warfare, and an infinity of small or local conditions. We get an occasional glimpse of these in the chronicles of the past, but they have merely an antiquarian interest. In the feudal age each chief looked after the welfare of his armed vassals if from no higher motive than personal interest, for his own power depended on the strength of his following. A victorious army imposed the care of its sick and wounded on the non-combatant population, whether friends or enemies, and the system of ransom which followed that of slavery often obtained for a fallen enemy greater care and consideration than he would otherwise have received. When the companies of feudal chiefs became replaced by commands recruited at large provision was made for the wounded by the central power or government.

The outbreak of our Revolution brought us first face to face with this question. Our improvised army was modeled on that of

England, and English medical methods necessarily influenced the elaboration of our own. These looked only to providing the army with intelligent medical men, efficient nurses and the needful allowance of medical and surgical supplies. They were of infinite value when brought into immediate relationship with the wounded, but there was no special provision to ensure that this would be effected. When a battle was in progress the medical men, nurses and supplies constituting the field or regimental hospitals were somewhere in the rear of the army with its other impedimenta, for at that time the medical armamentaria were regarded as impedimenta pure and simple—their value as preservative of the integrity of a line of battle being unrecognized. In Europe, where frequent wars had reduced the methods of the battlefield to system, the regulation distance of the impedimenta behind the fighting line was not less than one league. Here, during the battle, the medical men of the army attended such of the wounded as were able to reach them, or such special cases, generally officers of rank, as might be brought to them; and as in a general engagement there was usually no lack of such patients; the surgeons naturally considered themselves to be doing excellent and valuable work, although the poor fellows stricken on the field and unable to leave it without assistance derived no comfort from their proceedings. If defeated, the army withdrew, leaving the wounded to fall into the hands of the enemy; if victorious, arrangements were made to have them brought to the hospital. Servants, handsmen, and camp followers were sent to the field, and a force, volunteer or impressed, of the inhabitants of the vicinity, with all needful or available wagons, was organized for this work of mercy.

This, the usual method of bringing off the seriously wounded, was that adopted at Spire for the wounded of the French army of the Rhine under General Custine in the autumn of 1792. Although time honored by the practice of generations of military men, it did not meet with the approval of a young surgeon, D. J. Larrey, who had recently joined Custine's command. He thought that some effort should be made to reach and assist those men who were dying from shock, exposure and needless loss of blood, and he was

positive that lying uncared for on the field for twenty-four or more hours was not a desirable preliminary to amputation for gunshot injury. His disapproval of the regulation method became strengthened when some time later the wounded in an engagement at Limbourg had to be abandoned because before the arrangements for their removal were completed the defeated army received strong reinforcements. With the consent of General Custine he procured some light wagons and organized an ambulance volante or flying hospital intended to bring assistance to the wounded and remove them from the field during the battle. Its first service demonstrated its value. A strong force had been thrown forward to guard a mountain pass against the advance of the Austrians, and Larrey, in anticipation of an engagement, accompanied it with his ambulance wagons. The Austrians discovered the isolation of this force and surrounded it; but the French by a vigorous assault broke the enemy's line and succeeded in rejoining the main body, bringing with them in the ambulance wagons the wounded, who otherwise would have been left on the field. His ambulance for a division of troops consisted of eight two-wheeled, two-horse spring wagons and four four-wheeled, four-horse wagons for the wounded, with four store wagons and a personnel of over one hundred men, of whom fourteen were surgeons. Its value was so well appreciated that shortly afterwards Larrey was sent to Paris to organize ambulances for all the divisions of the army. He joined Bonaparte in his Egyptian campaign and personally supervised the operations of the flying ambulances of the French armies from that time until the Napoleonic sun set at Waterloo.

Meanwhile another surgeon of these wars, Baron P. F. Percy, serving with General Moreau's command, was also endeavoring to solve the problem of prompt aid on the battlefield. As the hospital trains were not allowed on the field on account of the uncertainty of the issue, the risk of capture, and the certainty that they would be in the way of the troops during some part of the action, Percy's idea was to transport to the field the essentials of surgical aid without blocking roads or impeding military movements. The surgical wagons which he constructed to effect this were modeled on those

of the light artillery. The art of preserving life, he considered, should compete in activity and promptness with that of destroying it. Each was drawn by six horses, and carried eight surgeons and as many orderlies, with instruments, stretchers and supplies. When a sheltered spot near the fighting line was reached the surgeons gave professional aid to the wounded who gathered near them, while the stretchers attached to the wagon were put to excellent service by the orderlies and men temporarily spared from the combatant ranks. When the work was finished the wagon was driven to some other part of the field where surgical assistance was in demand.

This wagon did much good during the short time it was in use. It gave aid to those who were able to reach it, but who could not have reached the hospital train two or three miles beyond; it gave vital assistance to many who otherwise would have died, and it brought aid and comfort to those who otherwise would have been exposed without either for hours; but particularly did it demonstrate how much good could be effected by the presence of medical officers, although the regulation hospitals and their supplies were miles away. It contributed as much as the ambulance volante to the immediate comfort and surgical safety of the wounded, but it left them on the field until the usual arrangements were made for their removal. Percy speedily recognized this inferiority of his system, and having abandoned the wagon he devoted his energies to adapting its personnel to work in connection with Larry's ambulance.

When with General Moreau in Spain he organized a company of brancardiers or stretcher-bearers from selected volunteers from the regiments. Each man carried one-half of a litter as part of his equipment. His lance or pike became a litter pole by removing its head; his sash formed one-half of the bed of a litter when laced lengthwise to a similar piece by eyelets, and on top of his knapsack he carried a horizontal traverse having at each end a hole for the pole to pass through and a downward projection which formed one of the legs of the completed litter. I submit below a translation of his own description of the brancardier as given in Laurent's life of this prominent military surgeon:*

*The term "brancardier" (brancard, a litter) would be so much the more appropriate for soldiers who are particularly charged with the removal, upon litters, of such wounded as cannot be transported otherwise, as the word has some consonance with, and also a certain relation to, the title of "grenadier," and would at the same time serve to indicate a select body of individuals possessing strength and skill as well as courage, and having the prerogative of marching at the head of their corps. Their organization and equipment must be such that any two brancardiers upon meeting and combining must be able to construct, anywhere and in a few minutes, a stout, comfortable, and I might almost say, elegant litter, and that the pieces of this litter can at the same time be utilized by both men for defensive as well as ornamental purposes. This litter is composed of two branches or poles, two traverses or cross pieces, and a piece of cloth deeply hemmed on both edges.

1st. The branches are made of pine wood cut with the grain; they are cut from a piece of scantling five inches thick; their length is seven and one-half feet. They are round with a circumference of five inches for the length of six feet, with a slightly increased thickness in the middle and tapering to the ends, which are used as handles, and are one and one-half inches less in circumference. Their weight hardly exceeds four pounds, and they have a resistance of two hundred pounds without scarcely bending, such is the tenacity and adhesive strength of pine when cut with the grain. No other kind of wood in our country with which we have experimented has stood this test. Ash, which appears to be most suitable, possesses the double disadvantage of being too heavy and too flexible. The branches properly painted, serve in turn as litter poles and as poles for a kind of halberd or pike. At one end they are provided with an iron tip to prevent their getting worn by being put on the ground, and at the other end with a wormed ferrule on which is easily screwed, in three turns, a lance point or a dagger, which is detached in the same manner and which the brancardier on duty carries on his left side in a scabbard attached to his shoulder-belt. In this manner he has as a weapon an imposing pike with which he can be put in action and sent on escort or convoy duty, and the staff of which he can use when necessary, and when he has a comrade within reach (which should always be the case in time of war) as a pole for the litter which he is supposed to handle. The lance head, the socket of which serves as a handle, takes the place of a sabre which he could not carry at his side without its being more or less in the way and without risk of incommoding the wounded. This weapon is formidable. It will be observed that its shape is such that it would break swords which might be opposed to it, and mounted upon its staff it recalls those long pikes to which the Marechal de Saxe was so partial, and which the spearmen of the ancients could use with such terrible effect upon their enemies.

2nd. The cross pieces, made of walnut, and which might also be made of well-seasoned oak or ash, serve to hold the two poles apart. They receive the extremities of the poles in round holes to which an increased depth is given by nailing on the end of each cross piece a block of wood pierced with a corresponding hole. This gives the litter more support and stability when it

is mounted and prevents it from shaking when it is being loaded. Each of the cross pieces is provided with two feet which raise the litter ten inches from the ground, a sufficient height and at the same time necessary that the brancardiers may conveniently grasp it. The cross pieces are all alike in size and the holes are so made that they will fit all poles and permit them to pass without effort or resistance. In general the different parts of the litter are constructed and arranged in such a uniform and equal manner that no matter what litter bearer may call upon another to construct jointly and without delay a litter with the parts which they respectively carry, the work is done with as much ease and dispatch as if each were in possession of one-half of the same litter.

The brancardier passes his traverse over his knapsack, which it, as it were, embraces, and on each side of which is a small pocket intended to receive the feet. He fastens it in the center by means of a small leather strap which he can unfasten himself or which his comrade unfastens for him, and *vice versa*. It bears upon an azure ground the inscription "*Secours aux braves*."

3rd. The cloth is a strong drilling with its borders hemmed their entire length, which is five and a half feet, and sewed in such a manner as to form two sheaths. When it is desired to put the litter together the poles are passed through the sheaths and withdrawn when they have served their purpose. The litter bearer carries his cloth, weighing two pounds and a half, either in his knapsack or as a sash or across the shoulder. It is necessary that each bearer carry his own cloth to insure the efficiency of the service; it could, however, be arranged so that one man would carry one-half of the cloth and his comrade the other half, which would make it easier to carry as a sash, either over or under the blouse; in that case, to put the litter together, each man would pass the staff he carries through the sheath of his half of the cloth, and together they would unite the two halves by means of eyelet holes placed along the edge of the cloth opposite to the sheath, and a strong cord or string with a small iron ball at its end; thus the cloth would admit of a great deal more stretching, and neither moisture nor rain, which cause textures, especially those which are twilled, such as drilling, to shrink, would ever retard or prevent the putting together of the litter; but these preparations would consume rather too much time, a disadvantage easily met by going to work at it beforehand, and which would be offset to a certain point by the saving of a whole piece of cloth which would not have to be issued to each individual litter bearer. No less than thirty-two litter bearers will be required for each company of field hospital attendants.

Percy's views however went further than the mere organization of bearer companies. In his effort to provide for the wounded he at one time endeavored to effect a reorganization of the medical service in the field; defining the rank of its officers and their staff position with a Major General as the chief, three Inspectors General, sixteen Lieutenant Colonels, etc. The Emperor declined to approve this proposition as it failed to include the physicians and pharma-

cists of the general hospitals, whom Percy seems to have intentionally omitted from his scheme; but the brancardier system was so successful that in 1813 it was formally adopted for the Imperial Armies.

Some combination of bearer companies and ambulance wagons is now in use in all armies; but the minutiae of the system are in many instances imperfect. Up to the year 1821 the Army Regulations of this country were silent on the subject of transportation of the wounded.* The Army Medical Department was apparently left to accomplish its ends by any available means, and presumably these would have been such as were known to have given satisfactory results elsewhere. In the year mentioned, however, the Regulations compiled by General Scott prescribed the method of aid on the battlefield in language clear as to its provisions, and yet so elastic in its requirements as to leave the Department free to exercise full discretion in its management. The Medical Director was authorized to establish field or movable hospitals, and these in the revised edition published in 1825 were called ambulances, in advantageous positions behind the line of battle, with smaller sections organized in like manner to follow detached columns and even to give succor to the skirmish line. The Quartermaster's Department was directed to provide the wagons after consultation with the Medical Director, but these wagons were to remain under the conduct of an officer or agent of that department. I have appended in a note the text of these requirements†. The direction to employ hired labor for the purpose of manning the ambulance system was the weakest point in the program. It was no doubt a concession to military custom which up to this time had been broken systematically only by the organization of the brancardiers of the French army.

During the period of uninterrupted peace which occurred at this time, our War Department officials became absorbed in current work relating to the movements of small detachments of troops in the West. War on the great scale dropped from their consideration, and in consequence the 1821 provisions for battlefield service were omitted from the Regulations published in 1834, 1835 and 1841. The only provision for assistance to the disabled in these official publications shows the narrowness of mind contracted by official

routine during those years. "For the accommodation of the sick and disabled a wagon will be attached to the rear guard when necessary and practicable, and a surgeon will attend to give assistance and to see that no improper persons are suffered to avail themselves of the accommodation." The war with Mexico then came upon us so suddenly that in a hasty reissue of the Regulations in 1847 there was no time to elaborate and incorporate a medical system for field service; and the Medical Department was left to do the best it could, trammelled, however, by its dependence for transportation on the Quartermaster's Department. System was evolved in the progress of the war, and the results were embodied in 1857 in the next issue of the Regulations. But in these there was a great lapse from the provisions of 1821. The latter made the Medical Department a free agent to enable it to sustain its high responsibilities and gave it the Quartermaster's Department for collaboration and assistance. In this they were in advance of the methods of all other armies; but the Regulations issued one-third of a century later fettered the Medical Department with the bonds of slavery to a so-called ambulance corps. The surgeon dropped to the status held by him in foreign armies as the mere attendant on the wounded when permitted by the officers of another department to come into personal contact with them. Even the medical director, a director only in name, was ordered to take his post for professional work at the principal depot.†

*The first Army Regulations, published in this country in 1808, entitled "The act for establishing rules and articles for the government of the armies of the United States with regulations respecting the same," makes no reference to the subject. The first official mention of medical transportation occurs in an enumeration of the duties of regimental surgeons in the "Military Laws and Rules and Regulations for the Army of the United States," issued in November, 1814. "He shall attend at the commencement of a march and designate such men as should be permitted to ride, or have their knapsacks transported in the wagons." Inasmuch as no special wagons are indicated the available baggage wagons were no doubt meant. The same regulations provided that "A two-horse wagon shall be allowed to each regimental hospital in which shall be conveyed a medicine chest of 200 or 300 weight, and three other chests under lock and key for blankets and bed sacks, cooking utensils and hospital stores."

†General Regulations for the Army; 1821. Article 55. *Field Hospitals*.
1. Besides the temporary or stationary hospitals established in the neighborhood of an army for the reception of the sick, etc., there shall be organized,

by the medical director attached to general headquarters, *field or moveable hospitals*, to follow the corps during operations, and to give to the wounded the most prompt assistance.

2. For these purposes the medical officers, etc., will be organized into a field depot, divisions, sections and a flying hospital; the extent of each is to correspond to the corps to which it is attached.

3. On the day of a battle the field depot shall be placed, as near as may be, behind the center of the army, and as near the line as practicable, without compromising its safety. The divisions will, in like manner, be posted behind the wings of the army, or the principal operating column; the sections will follow the smaller or detached corps, or will be held in readiness, near points at which partial shocks may be expected. The flying hospital will be with the advance guard; the surgeons, etc., lightly mounted and equipped, ready to fly to the points where the action is hottest, and to afford the earliest succor to the wounded.

4. The medical director will, in concert with the quartermaster-general, cause a suitable number of light wagons and attendants to be attached to the several parts of the field hospital, each detachment under the conduct of an officer or agent of the quartermaster's department. When practicable, these attendants will be selected from the country people.

5. The field depot and the divisions will be provided with a sufficient number of litters, etc., for the removal of the wounded to the stationary or general hospitals in the rear. They will also be furnished with cases of instruments, blankets, some brandy, wine, vinegar, salt, bread, etc., etc. Most of these aids and supplies will be equally necessary to the sections and flying hospital, and will be furnished accordingly.

6. As soon as the action commences, the field depot and divisions will be ready to receive the wounded, and hold displayed their instruments, medicaments, etc., etc.

†Regulations for the Army of the United States; 1857. Art. XXXVI. Troops in Campaign. Par. 716. *Battles*. Before the action the quartermaster of the division makes all the necessary arrangements for the transportation of the wounded. He establishes the ambulance depots in the rear, and gives his assistants the necessary instruction for the service of the ambulance wagons and other means of removing the wounded.

717. The ambulance depot, to which the wounded are carried or directed for immediate treatment, is generally established at the most convenient building nearest the field of battle. A red flag marks its place, or the way to it, to the conductors of the ambulances and to the wounded who can walk.

718. The active ambulances follow the troops engaged to succor the wounded and remove them to the depots; for this purpose the conductors should always have the necessary assistants, that the soldiers may have no excuse to leave the ranks for that object.

719. The medical director of the division, after consultation with the quartermaster-general, distributes the medical officers and hospital attendants

at his disposal, to the depots and active ambulances. He will send officers and attendants, when practicable, to the active ambulances, to relieve the wounded who require treatment before being removed from the ground. He will see that the depots and ambulances are provided with the necessary apparatus, medicines and stores. He will take post and render his professional services at the principal depot.

720. If the enemy endanger the depot, the quartermaster takes the orders of the general to remove it or to strengthen its guard.

721. The wounded in the depots and the sick are removed, as soon as possible, to the hospitals that have been established by the quartermaster-general of the army on the flanks or rear of the army.

The Regulations of 1861 found us engaged in a great war, responsible before public opinion for the care of the wounded, yet unable to accomplish anything without the consent and active co-operation of officers who were not held to this responsibility. Many of these officers were volunteers ignorant of their power under the regulations and actuated, as were the regular officers of the Quartermaster's Department, by no petty jealousy of position, rank or power, but solely by a desire to accomplish the end in view of doing the best for the wounded under the conditions of the time. The medical work on the battlefields of the civil war progressed, therefore, under an intelligent appreciation of what the Regulations should have been rather than what they were—and as a result an ambulance corps was organized, a combination of Larrey's ambulance volante and Percy's brancardiers, the whole under the orders of the Medical Director, although officered for purposes of domestic economy and property responsibility by details from the line of the army. I append as a note the Act copied from the War Department order establishing the corps.*

*An act to establish a uniform system of ambulances in the armies of the United States. *Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That the Medical Director, or chief medical officer of each army corps, shall, under the control of the Medical Director of the Army to which such army corps belongs, have the direction and supervision of all ambulances, medicine and other wagons, horses, mules, harness and other fixtures appertaining thereto, and of all officers and men who may be detailed or employed to assist him in the management thereof, in the army corps in which he may be serving.

Sec. 2. *And be it further enacted,* That the commanding officer of each army corps shall detail officers and enlisted men for service in the ambulance

corps of such army corps, upon the following basis, viz.: one captain, who shall be commandant of said ambulance corps; one first lieutenant for each division in such army corps; one second lieutenant for each brigade in such army corps; one sergeant for each regiment in such army corps; three privates for each ambulance, and one private for each wagon; and the officers and non-commissioned officers of the ambulance corps shall be mounted; *provided*, That the officers, non-commissioned officers and privates so detailed for each army corps shall be examined by a board of medical officers of such army corps as to their fitness for such duty; and that such as are found to be not qualified shall be rejected, and others detailed in their stead.

Sec. 3. *And be it further enacted*, That there shall be allowed and furnished to each army corps two-horse ambulances, upon the following basis, to-wit: Three to each regiment of infantry of five hundred men or more; two to each regiment of infantry of more than two hundred and less than five hundred men or more; and one to each regiment of infantry of less than two hundred men; two to each regiment of cavalry of five hundred men or more; and one to each regiment of cavalry of less than five hundred men; one nently attached; to the headquarters of each army corps two such ambulances; to each battery of artillery—to which battery or artillery it shall be permanent and to each division train of ambulances two army wagons; and ambulances shall be allowed and furnished to division brigades and commands not attached to any army corps upon the same basis, and each ambulance shall be provided with such number of stretchers and other appliances as shall be prescribed by the surgeon general; *provided*, That the ambulances and wagons herein mentioned shall be furnished, so far as practicable, from the ambulances and wagons now in the service.

Sec. 4. *And be it further enacted*, That horse and mule litters may be adopted or authorized by the Secretary of War, in lieu of ambulances, when judged necessary, under such rules and regulations as may be prescribed by the Medical Director of each army corps.

Sec. 5. *And be it further enacted*, That the captain shall be the commander of all the ambulances, medicine and other wagons in the corps, under the immediate direction of the Medical Director, or chief medical officer, of the army corps to which the ambulance corps belongs. He shall pay special attention to the condition of the ambulances, wagons, horses, mules, harness and other fixtures appertaining thereto, and see that they are at all times in readiness for service: that the officers and men of the ambulance corps are properly instructed in their duties, and that their duties are performed, and that the regulations which may be prescribed by the Secretary of War, or the Surgeon General, for the government of the ambulance corps are strictly observed by those under his command. It shall be his duty to institute a drill in his corps, instructing his men in the most easy and expeditious manner of moving the sick and wounded, and to require in all cases that the sick and wounded shall be treated with gentleness and care, and that the ambulances and wagons are at all times provided with attendants, drivers, horses, mules and whatever may be necessary for their efficiency; and 't shall

be his duty also to see that the ambulances are not used for any other purpose than that for which they are designed and ordered. It shall be the duty of the medical director, or chief medical officer of the army corps, previous to a march, and previous to and in time of action, or whenever it may be necessary to use the ambulances, to issue the proper orders to the captain for the distribution and management of the same, for collecting the sick and wounded and conveying them to their destination. And it shall be the duty of the captain faithfully and diligently to execute such orders. And the officers of the ambulance corps, including the medical director, shall make such reports, from time to time, as may be required by the Secretary of War, the Surgeon General, the Medical Director of the army, or the commanding officer of the army corps in which they may be serving; and all reports to higher authority than the commanding officer of the army corps shall be transmitted through the Medical Director of the army to which such army corps belongs.

Sec. 6. *And be it further enacted*, That the first lieutenant assigned to the ambulance corps for a division shall have complete control, under the captain of his corps and the Medical Director of the army corps, of all the ambulances, medicine and other wagons, horses, mules and men in that portion of the ambulance corps. He shall be the acting assistant quartermaster for that portion of the ambulance corps, and will receipt for and be responsible for all the property belonging to it, and be held responsible for any deficiency in anything appertaining thereto. He shall have a traveling cavalry forge, a blacksmith and a saddler, who shall be under his orders, to enable him to keep his train in order. He shall have authority to draw supplies from the depot quartermaster, upon requisitions approved by the captain of his corps, the Medical Director and the commander of the army corps to which he is attached. It shall be his duty to exercise a constant supervision over his train in every particular, and keep it at all times ready for service.

Sec. 7. *And be it further enacted*, That the second lieutenant shall have command of the portion of the ambulance corps for a brigade, and shall be under the immediate orders of the first lieutenant, and he shall exercise a careful supervision over the sergeants and privates assigned to the portion of the ambulance corps for his brigade; and it shall be the duty of the sergeants to conduct the drills and inspections of the ambulances, under his orders, of their respective regiments.

Sec. 8. *And be it further enacted*, That the ambulances in the armies of the United States shall be used only for the transportation of the sick and wounded, and in urgent cases only for medical supplies, and all persons shall be prohibited from using them, or requiring them to be used for any other purpose. It shall be the duty of the officers of the ambulance corps to report to the commander of the army corps any violation of the provisions of this section, or any attempt to violate the same. And any officer who shall use an ambulance, or require it to be used, for any other purpose than as provided in this section, shall, for the first offense, be publicly reprimanded by the commander of the army corps in which he may be serving, and for the second offense shall be dismissed from the service.

Sec. 9. *And be it further enacted*, That no person except the proper medical officers, or the officers, non-commissioned officers and privates of the ambulance corps, or such persons as may be especially assigned, by competent military authority, to duty with the ambulance corps for the occasion, shall be permitted to take or accompany sick or wounded men to the rear, either on the march or upon the battle field.

Sec. 10. *And be it further enacted*, That the officers, non-commissioned officers and privates of the ambulance corps shall be designated by such uniform or in such manner as the Secretary of War shall deem proper; *provided*, that officers and men may be relieved from service in said corps, and others detailed to the same, subject to the examination provided in the second section of this act, in the discretion of the commanders of the armies in which they may be serving.

Sec. 11. *And be it further enacted*, That it shall be the duty of the commander of the army corps to transmit to the Adjutant General the names and rank of all officers and enlisted men detailed for service in the ambulance corps of such army corps, stating the organizations from which they may have been so detailed; and if such officers and men belong to volunteer organizations the Adjutant General shall thereupon notify the Governors of the several States in which such organizations were raised of their detail for such service; and it shall be the duty of the commander of the army corps to report to the Adjutant General from time to time the conduct and behavior of the officers and enlisted men of the ambulance corps, and the Adjutant General shall forward copies of such reports, so far as they relate to officers and enlisted men of volunteer organizations, to the Governors of the States in which such organizations were raised.

Sec. 12. *And be it further enacted*, That nothing in this act shall be construed to diminish or impair the rightful authority of the commanders of armies, army corps or separate detachments over the medical and other officers and the non-commissioned officers and privates of their respective commands.

Approved March 11, 1864.

Under these provisions the ambulance and field hospital service of the United States armies became models for the military surgeons of Europe. Their ability to deal with large numbers of wounded was fully demonstrated during the series of battles and marches, beginning with the crossing of the Rapidan and the battle of the Wilderness, and ending six weeks later with the commencement of siege operations at Petersburg, Virginia. On several occasions during this trying time the headquarter wagons of general officers were turned over to the Medical Department for field work; but this indicated no weakness of the system, merely a shortage of ambulance wagons—and it is to be observed that there would have been no shortage but for the imminence or the actual occurrence

of an engagement during the temporary absence of some part of the ambulance train at the base of supplies. Ordinarily in the absence of railroad transportation empty supply wagons were utilized for the evacuation of the field hospitals, but during this active campaign the wagons of the ambulance volante were called upon to do some duty d'arriere as well as their own special duties d'avant. Practically the work of the battlefield and field hospitals was done with the organization that we now have in the Medical Department of the United States Army. A staff corps of surgeons and a similar corps of enlisted men thoroughly educated in the principles and drilled in the practice of first aid. These corps did not then have a legal existence. They were extemporized by Medical Directors out of regimental and other surgeons and regimental and other nurses and hospital attendants. But since 1887 a special Hospital Corps, authorized by Congress, has been organized and educated. At the present time its members are scattered at 120 different posts, but if an order were to be issued for the mobilization of our army, its Hospital Corps could be organized into bearer companies and field hospitals as quickly as the troops could be brigaded. I append below a few paragraphs from existing Regulations showing the control of the Medical Department over its men and transportation, and the methods prescribed for giving aid during battle.*

*1590. In time of war, ambulance and field hospital services will be performed by members of the hospital corps. The privates of the corps, to perform the duties of litter-bearers, service with the ambulances, and at dressing and ambulance stations, should number at least two per cent of the aggregate strength of the command. To every ten privates there should be an acting hospital steward, and to every thirty privates a hospital steward.

1591. The ambulance and hospital service of each corps shall be under the supervision of its Medical Director. He should, under such directions as he may receive from the Medical Director of the Army, make all necessary arrangements for the care and transportation of the wounded, who, during an engagement, will receive attention at the following principal points, and in the following order: 1st, with the line of battle under fire; 2nd, at the first dressing stations; 3d, at the ambulance station; 4th, at the division hospitals. He establishes the ambulance stations in the rear, and gives directions concerning the first dressing stations; details the proper number of privates of the hospital corps, acting hospital stewards, hospital stewards and medical officers

for duty with the advance line, and for the care and transportation of the wounded between the front line, the first dressing stations, the ambulance station and the division hospital.

1592. First dressing stations will be established at the nearest place to the combatants, where the wounded and those caring for them may not be unnecessarily exposed to fire. Ambulance stations will be established at some place of security in the rear, or in some convenient building near the field of battle. The division hospital will be established by the medical director, after consultation with the commanding general. * * *

1596. The Medical Director of an army corps shall, under the direction of the Chief Medical Director of the Army, exercise supervision of its ambulances, medicine wagons and the animals, harness and other fixtures appertaining thereto. He will be assisted by suitable officers detailed for the service. These officers will see that the ambulance service is kept in efficient condition, that privates of the hospital corps detailed for duty therein are properly instructed, and will in all things be guided by such regulations as the Secretary of War may issue for their government. * * *

1599. It shall be the duty of the Medical Director, or chief medical officer, of the army corps, previous to a march, and previous to and in time of action, or whenever it may be necessary to use the ambulances, to issue the proper orders to his assistants for the distribution and management of the same in collecting the sick and wounded and conveying them to their destination.

Instead of being a loose aggregation of regimental and hospital surgeons incapable officially of doing anything but practice their profession when the military exigencies permitted or required them to do so, the Medical Department is now a compact body responsible for the care of the sick and wounded and having the powers of commanding officers over the personnel and material specially provided for carrying out its purposes.

Gentlemen, when I was requested to contribute to the history of the transportation of wounded men from the field of battle my mind ran back to the esquire and his wounded knight—the officer brought off in his sash by servants, the Scottish Highlander in his plaid by clansmen, and the soldier generally in his blanket between two pikes or muskets or pic-a-back on the shoulders of a friend; but a little thought showed me how immaterial were these trifles as compared with changes in the status of the medical officer, and the power which he could exercise in providing facilities or in rendering them available. In this really, and not in an improved ambulance wagon or a modified litter sling, lies the progress and history of the transportation of the wounded from the field.

The car of progress moves slowly. For some undefined reason medical men labor at a disadvantage in fields of practical work, although these may be allied closely to their own. It seems to have been assumed that because a man is intelligent enough to be capable of taking care of another in sickness or injury he should be regarded as incapable of doing anything else with the ability that might be expected of one who has never been exposed to the deteriorating influence of medical knowledge. Although the French surgeons did so much to mitigate suffering and save life on the battlefield by suggesting and organizing new systems and testing and demonstrating their value, it was not until 1882 that the Medical Department of the French Army was given command of these organizations, nor until seven years later that it was empowered to control its supplies. During that long period its members remained merely doctors, caring for the sick and instructing nurses and stretcher-bearers, whose services were afterwards controlled along with their own by officers who, in the interests of the wounded, should have been their assistants. And although Percy a century ago recommended a staff corps of military surgeons, the French still maintain their regimental officers and "soldats infirmiers" or regimental nurses, the former equivalent to our medical officers on duty at the first aid stations and the latter to our company bearers.

The Germans perfected their field medical service during the war of 1870. Besides special aid on the fighting line they have a bearer company of about 200 men to each division and a reserve company to each corps. To 36,000 men, forming a corps of two divisions, they have, therefore, about 600 men for bearer duty; but the field hospitals of the corps are manned by as many more, so that exclusive of medical officers the sanitary force is equal to over three per cent of the troops in line. The Medical Department controls its men, transportation and supplies.

The conservatism of the British military authorities was slow to permit new ideas to modify the sacred customs of service, so that although the medical officers engaged in the campaigns against Napoleon were well aware of the advantages of the methods of Larrey and Percy, and made many appeals to the Government to be per-

mitted to do likewise, these were uniformly disapproved. The Duke of Wellington was chiefly responsible for this, as he would not hear of encumbering his army and impeding its movements with these wagons. Wounded Frenchmen were succored while the din of battle was yet in their ears, but their British opponents had to lie exposed not only during the continuance of the struggle but during the long watches of the night until arrangements were perfected for their removal. The available wagons of the supply departments and such as could be hired or impressed into the service were brought up along with the bandsmen, camp followers and hired labor to give the long delayed aid and transport the sufferers to the hospitals. The stretchers used in loading consisted of a canvas bed between two pikes or poles, with no cross-pieces to keep them apart. The long wars of the early part of the century improved the organization and internal economy of the British field hospitals, but effected no immediately beneficial change in their methods of transportation. Nor was anything done until the outbreak of the Crimean war, when a Hospital Conveyance Corps was hastily organized and shipped with the troops. This was so decided a failure that the work of transporting the wounded had to be transferred to the train of the Subsistence Department. The wagons of the Conveyance Corps were too heavy; no provision was made for repair in case of accidents, and the men were old, broken down and dissipated soldiers weeded out of the regimental ranks rather than selected on account of special fitness for important duties. After the Crimean war a Medical Staff Corps was organized in order to provide a better personnel for the care of the wounded than could be obtained under the old system of regimental details. I need say nothing here of this regimental system as our regular army officers are personally familiar with its objectionable features, some of which I delineated in a paper read at the last meeting of this Association. The Medical Staff Corps proved a failure on account of being composed of hired civilians. In 1873, however, an important change was effected. The British abolished their regimental system of medical appointments and established a staff corps of officers and a hospital corps of enlisted men such as we have now in the Army of the United States; but these medical

officers have one disadvantage yet to overcome. Their ambulances are not under their control; the officers of the Army Transportation Corps command them.

And so in all armies we now find bearer companies and ambulance trains with unimportant differences in their composition and more important differences in the control exercised over them by those most interested in the welfare of the wounded. Patriotic officers of corps other than the medical may claim as much interest in their wounded countrymen as any man could have when not bound by special ties of blood or friendship, and so far as their knowledge goes they are no doubt warranted in making the claim; but they have no knowledge of the interest of the medical man in lives or limbs susceptible of being saved. He is interested in the wounded on account of what he as an individual may be able to accomplish and also on account of what medical and surgical science may be able to effect; and to these interests, of which the Transportation Corps or Quartermaster's officer knows nothing, he may claim a full share of interest on behalf of patriotism.

But every system for the care and transportation of the wounded, no matter how carefully organized, may occasionally be crushed and paralyzed by the iron heel of war. Of what avail, for instance, were Larrey's ambulances on the disastrous march from Moscow when men, narcotized by cold, fell and were shrouded in snow before the heart had ceased to pulsate,—when they were cut off on the Berezina and the great surgeon was himself saved only by being passed over the blocked, broken and enfiladed bridge on the shoulders of the men,—or when the Sisters of Charity at Wilna were endeavoring to rally him from his exhaustion at the end of that terrible march.

Thanks to the better parts of human nature scenes of this kind will be of less frequent occurrence in war hereafter. To alleviate the sufferings of the wounded commanding generals have sometimes made temporary arrangements for the neutrality and safety of surgeons and others engaged in the humane work. The success of an agreement of this kind in 1743 between Stair and the Duc de Noailles led Baron Percy in 1800 to draw up a similar compact, which Moreau signed and sent to the Austrian General Kray, but the latter

declined to entertain the proposition. Commanding generals have not plenary powers. Kray was no doubt tied down by the military power at Vienna. But an arrangement of this kind has now been effected on behalf of the wounded of all civilized nations by the influence of the International Red Cross Society. I need not dwell on the provisions of the various articles of the Geneva Convention, the practical operation of which has been tested in the wars of Europe since 1864.

During the past century much progress has been made in the evolution of the ambulance wagon. Larrey's two-wheeled vehicle consisted of an oblong box suspended from springs at its four corners, closed by folding doors in front and rear, and having openings with sliding shutters in the sides for the admission of light and air. On the floor were two padded litters on casters; and to facilitate the handling of these when loaded, four iron handles were attached to the sides of each.

The first ambulance wagon officially recognized in this country was the Moses wagon, which was examined by a medical board in 1859. It was evidently intended to meet the special requirements of our Western service, the chief characteristics of which were long marches made by small commands. It was reported to be a kind of large omnibus fitted up as a traveling hospital, and capable of extending its shelter at night or in camp by the use of attached canvas so as to accommodate about thirty persons.

The Wheeling ambulance, weighing only 700 to 800 pounds, was used extensively during the civil war. It was furnished inside with padded seats for eight, convertible into beds for two. By some it was considered too light or frail for field service, but it was simple in construction, easily kept in repair, and as a matter of fact in many of the divisions of the Army of the Potomac it survived the war after participating in every campaign. Since then I have seen it in Western service accompanying troops over mountain trails where none of the wagons of recent construction could have been taken. Our present ambulance wagon is an altered Rucker, converted into a medicine wagon in front by a well which contains two medicine chests. It is thus excellently suited for the current work of accom-

panying small commands on marches and such field service as we have on the Mexican frontier, but is wholly unfit for battlefield service in time of war. Ambulance wagons should be suited for the work required of them. Ambulance surgeons, civil as well as military, recognize this principle. This subject is on our program for discussion; but meanwhile I desire to say as a conclusion from the study of its history, that if we again have to gather up our wounded from the battlefield by divisions and corps, it is not by means of our present wagons that we shall accomplish our object, but with shells on wheels in so far resembling the Wheeling ambulance wagon that they can hover under shelter in rear of a skirmish line or line battle irrespective of the presence or absence of macadamized turnpikes.

The evolution of the stretcher has kept pace with that of the ambulance wagon. The huge knife with which the men of our Hospital Corps are armed, although under the terms of the Geneva Convention they should carry no arms, recalls the head of the brancardier's pike when worn as a side arm; but all the other parts of the Percy litter have been consolidated into a single compact piece. Two of these when open and in use should fit and fill the floor of the ambulance wagon, and the handles should be long enough to keep the equipments of No. 2 of the litter squad when engaged in actual bearer work from bumping against the feet of the patient. Majors Havard and Hoff who have given more study to this subject than most of our regular medical officers, will by and by show us how far we have succeeded in getting away from the pike, sash and traverse of Baron Percy's brancardiers.

In this country we have had little experience on a war scale of any other mode of field transportation than the stretcher, the ambulance, and the army wagon, the last being the wagon of the general supply train, the "six-mule team" of the War of the Rebellion. Observe the use of the word ambulance in the last sentence instead of the term ambulance wagon. This is an Americanism which grew into our use of language during our civil war. Larrey understood by an ambulance an aggregation of light wagons, drivers, surgeons, attendants and supplies in aid of the wounded, and in Europe at the present time the word conveys the same meaning; but very generally

in America it means merely one of the light wagons belonging to the European ambulance or field hospital. Here we have room for international misunderstanding. When I as an American speak of six ambulances I mean six ambulance wagons; but the military surgeon of Europe would understand me to mean six field hospitals, each having probably more than this number of the light wagons to which the term in my American usage of it has reference. It might be well for this Association to stamp an official impress on the word. To avoid misunderstanding when the report of our proceedings is in the hands of foreign readers, I have been careful to use the word as an adjective, but in the sentence to which I have invited attention, I have made use of it American fashion in order to introduce this suggestion.

In individual instances we have tried several modes of field transportation other than the hand-litter and wagon. Many of our officers, in the absence of wheeled vehicles, have taken a lesson from the Indian and brought off their wounded on improvised travois; and have thereafter given much thought to elaborating as a perfected and prepared piece of mechanism that which owes the whole of its value to the fact that it can be so easily improvised. Single litters based on a pack saddle or aparejo have been constructed by some of our officers, and cacolets and horse litters were tried in a small way during our war, but in every instance with unsatisfactory results as one grand disadvantage affected each and all of them, their utter valuelessness in the absence of mules or horses specially trained for their service. In the Crimea, Algeria and Mexico cacolets were largely used by the French troops, and many favorable reports are on record concerning them. The cacolet method has indeed been characterized as "the most perfect system that has yet been devised for the transportation of sick and wounded on the field." This shows what may be accomplished by care and training notwithstanding the inherent difficulties of the method. American opinion, in so far as I have been able to gather it, is against the use of these many ingenious contrivances, for it is held that if a wounded man is unable to move off on foot or to ride a gentle horse he should be carried recumbent in an

ambulance or other carefully prepared wagon or, in the absence of wagons, on a hand-litter if the distance is short or a travois if it is long.

After the battle of Bautzen Baron Larrey noted with much gratification the "convenient and expeditious" manner in which the wounded were conveyed from the field to the city of Dresden in wheelbarrows. This observation no doubt originated the wheeled litter and gave rise to many of the efforts that have been made to perfect it. But the wheeled litter did not occur to Larrey. His was a broad mind; and the incident showed him "how important it is for a surgeon in chief to study the facilities afforded by the country through which the army is passing." American surgeons have had few opportunities of acting on this suggestion. The Indian travois is their only development in this line. The loyal British subject points with pride to the fact that the sun never sets on the flag of his government. Medical officers of the British Army have studied the facilities for transportation in every quarter of the globe, and in many of its obscure corners. Their published works on this subject are filled with modifications of "native" methods. It is needless to do more than mention the palanquin, dooley, dandy, etc., because these are acknowledged to be valuable only under the conditions prevailing in the locality which originated them, and to compare unfavorably for the general purposes of modern warfare with the lineal descendants of Percy's stretchers and Larrey's ambulance wagons.

In future wars all ambulance wagons drawn by animals except the light wagon for battlefield service, will be superseded by railroad transportation. An excellent system of hospital trains was in use at the close of our civil war although at first we had no experience in this line. Cars returning to the base of operations for supplies were frequently utilized for the removal of sick and wounded with only such provision for comfort and the amelioration of suffering as could be extemporized by comrades or attendants. But after a time, on account of the frequent recurrence of movements of this kind, railroad transportation ceased to be regarded as an emergency measure, and improvements speedily followed until carefully outfitted trains with kitchen, dispensary and office cars became a part of our medical

service,—and these continue to have a formal recognition in our Army Regulations.

Although we worked out our system of hospital trains by the light of our own experience the subject had already been discussed in Europe. In 1859 a French military surgeon, M. Perier, suggested an adaptation of the ordinary baggage car for hospital purposes, and in 1860 Professor Gurlt of Berlin brought forward a similar proposition; but the question was first solved in practice in 1863 during the progress of our war. Since then great progress has been made in Europe mainly through the efforts of the Red Cross Society.

The transportation of the wounded by ships of special construction and equipment dates from the time of the Crimean war, when Britain provided a hospital fleet to bring her sick and wounded to the general hospitals at Scutari and thence home. Early in the progress of our war Mississippi River steamers were altered for hospital purposes, and later many vessels, some built specially for the service, were employed on the Atlantic and Gulf coasts. The Medical Department was at first liable to be deprived of these vessels at any time by local commanders who desired their use as transports for men or supplies; but an order subsequently issued gave the department exclusive control of "all hospital transports and hospital boats properly assigned as such." The hospital boat, like the hospital railroad train, is recognized by existing Army Regulations,* so that in case of war the development of transportation by water as well as by land would depend on the energy of the Medical Department and the available appropriations.

*A. R. 1602. * * * * members of the hospital corps will
be allowed as follows: * * * * *

(b) To a railway hospital train of twenty cars, carrying six hundred sick and wounded, two hospital stewards, six acting hospital stewards and one hundred privates. To trains of a greater or less capacity the number will be in the same proportion; to vary, however, at the discretion of the Medical Director, according to the distance to be traveled and the character of the cases to be transported.

(c) To a hospital boat of three hundred beds, three hospital stewards, six acting hospital stewards and sixty-five privates; or in like proportion to hospital boats of a greater or less capacity.

I desire in conclusion to make a reference to the small-calibre and tunneled bullets. Some officers consider that their disabling power at long range will prevent assistance from reaching the wounded until the battle has been fought. I by no means concur in this view. Battles are not fought on the dead level where every object within range would be struck, but on broken ground where every irregularity or swell affords more or less protection from the enemy's fire. I feel confident therefore that the hospital corps and its ambulances will be found close to the fighting line in the battles of the twentieth as in those of the nineteenth century.

LITTER AND AMBULANCE TRANSPORTATION.

BY MAJOR V. HAVARD,

Surgeon U. S. Army.

The soldier wounded on the line of battle or anywhere on the field must be carried off as soon as practicable, and humanity as well as the best interests of the service require that this transportation should be effected by a special body of trained non-combatants; these are now accepted propositions upon which it is needless to dwell.

The litter-bearers should go to the relief of the wounded as soon as it is possible to do so without being in the way or running unreasonable risks. They will often be exposed to the same dangers as the combatants and, from their unarmed condition, sometimes need more coolness and bravery to perform their duties efficiently. The only privilege conferred upon them by the Geneva cross which they wear on the left arm is immunity from capture.

The necessity for the prompt removal of the wounded being recognized, how should it be accomplished? Light-wheeled vehicles drawn by hand have been proposed but as yet never tried, and it is very doubtful whether they can ever be of practical use on the battlefield. Perhaps the principle of the bicycle might be turned to account, the bicycle being so constructed as to carry a loaded litter, the bearers holding the handles as usual but simply drawing and pushing instead of carrying; in case of obstacle, litter and bicycle would be lifted

over it. The idea may be worth developing although it can, at best, only be applicable to roads and smooth paths.

For the present, as in the past, the *stretcher** or hand-litter must be our main reliance, and all our drills and provisions for the transportation of the sick and wounded are specially based upon the employment of the litter on the first line of help and the ambulance-wagon on the second and third lines.

The Army regulation litter consists of a canvas bed 6 feet long and 22 inches wide, made fast to two poles $7\frac{1}{2}$ feet long, and stretched by two jointed braces or traverses. The ends of the poles form the handles, 9 inches long, by which the litter is carried.

In the construction of the litter there are obvious requirements now generally accepted:

1st. The litter should be one and the same for all purposes; we must have only one pattern whether to carry patients off the field or for ambulance transportation. Until recently we had two patterns, one with fixed handles for ordinary field service and the other with movable telescopic handles for ambulance use; the latter has been properly suppressed. Two patterns are still in use in the English service, but the old one is being eliminated as fast as possible. The use of two different litters is necessarily confusing; it complicates the instruction, wastes precious time in transferring patients from one to the other and subjects them to additional handling, suffering and danger.

2d. The litter must admit of quick and easy opening and closing, so that in the field we may always take it, where the wounded lie, in its most portable shape, that is closed. The difficulty in moving an open litter through woods, shrubbery or crops must be obvious; on the contrary, a closed litter can be carried by one man at the shoulder, or by two men at the carry, through obstructions or over obstacles without unnecessary fatigue or delay; it is opened by the side of the patient or a short distance before reaching him. This necessity of quick and easy opening and closing condemns the French

**Stretcher*, of Anglo-Saxon origin, and unmistakable meaning, is a much more suitable name than *litter*, derived from the French *litiere*, which means a vehicle carried on the back of animals, the French name for *stretcher* being *brancard*.

method and other similar systems in which, instead of jointed braces, rigid traverses are used, the setting of which often causes much delay. Our regulation litter is also somewhat defective in this respect; the braces do not work easily and safely; the hand is often inadequate, always in some danger, and the bearer gets into the bad habit of using his foot; a handle at the end of one of the joints seems necessary as in the Furley stretcher.

3d. The handles must be fixed and immovable, that is, they must simply be the ends of the poles and in no way jointed or detachable. Experience shows that movable handles add to the complexity of construction, impair the strength of the litter, frequently break or get out of order and unnecessarily complicate the "manual" in loading and unloading ambulance. Their only possible object is to diminish the length of the litter so as to permit the use of a shorter ambulance, but this is not of sufficient importance to justify them. No European army has such handles.

4th. The litter should have legs in order to raise the patient off the ground and make its handling easier for the bearers, and these legs should be fixed. Folding legs are a constant source of trouble to the bearer and danger to the patient; they complicate the manual and prevent the introduction of the litter into the ambulance except through the medium of an added apparatus such as the truck of the French ambulance-wagon or the set of rollers of our old-pattern ambulance. Fixed legs must be short so as not to be in the way when the litter is closed and strapped, and so constructed as to slide easily upon the floor of the ambulance. The legs of our regulation litter have the right size and shape, being 4 inches high and curved into a loop or stirrup; the front pair being laid on the edge of floor of the ambulance, the rear bearer has no difficulty in pushing the loaded litter into position. The fixed leg of the German litter consists of an iron strap somewhat curved at the end, which I fear does not easily slide upon the ambulance floor; that of the English litter consists of a large wooden roller intended to facilitate the introduction of the litter into the ambulance by substituting rolling for sliding; this roller does not raise the litter high enough above the ground

for the comfort of patient and bearers; it easily becomes clogged and unserviceable by sand, gravel or mud.

5th. Lightness, simplicity of construction and strength are necessary qualities upon which little need be said. Lightness is a great desideratum, and how to make our litter at once light and strong enough to stand the very rough usage of field work is a problem which I regret to say has not yet been satisfactorily solved. Our regulation litter is strong enough but heavier than it need be, weighing with slings 24 pounds. If the slings be removed, the poles somewhat shaved down and the legs made of a simple loop of strap iron (instead of the rather complex and heavy loop of cast iron) the weight can be safely reduced about 4 pounds. The litter should not weigh over 20 pounds, and if practicable should be reduced to 16; such reduction can only be made by changing the material of the poles; aluminum may give good results and so might bamboo. I have tried slender ash poles reinforced by narrow bands of steel, but with very little success so far as any lightening of the litter was concerned. The French litter is the lightest of European litters but weighs 25 pounds; the latest English litter weighs 32 pounds.

Lightness, however, must not be obtained at the sacrifice of other and equally necessary qualities. For instance, a litter without braces or legs, with or without folding poles, and capable of being rolled up into a small, neat package, may be interesting and might even prove useful at a summer camp to carry patients a few hundred yards to the hospital tent, but it would certainly be useless on the battle-field. Likewise must I deprecate litters whose beds are made of two or three sections, each section to be slid separately under the patient with the pleasant expectation that he is thus left undisturbed; my opinion is that such sliding under will cause more pain or discomfort than the regular lifting at the hands of a well-trained litter squad.

6th. The litter should be as short as possible, not only to reduce weight but also that the ambulance which is to accommodate it may be as small and light as practicable. The proper length appears to be $7\frac{1}{2}$ feet, 6 feet of canvas for the patient and $1\frac{1}{2}$ feet for the handles, that is 9 inches for each pair; longer handles are unnecessary and, if

smaller, would not give to the bearers the needful freedom of motion.

7th. Shoulder slings to help in carrying the litter are recognized by all authorities as indispensable; they throw upon the shoulders and the spinal column the weight which otherwise would bear upon, and soon tire out, the muscles of the hands and arms, and it is safe to assert that a bearer with slings is able to do twice as much work as without them. Their use must therefore be made a part of the manual of the litter. There are two methods of using slings and only two, I think, worth considering: They may be fixed to the litter, one to each end, or else each bearer may carry his own individual sling. The method of fixed slings is illustrated in our regulation litter; they are permanently fastened to the handles and are an integral part of the litter; they can not get detached or lost and wherever the litter goes the slings are found with it. Fixed slings, however, have disadvantages; they add to the weight of the litter, complicate the manual and must be readjusted to the size of the bearers every time posts are changed. With individual slings each man is responsible for his own, receiving it as part of his equipment; it remains always exactly fitted to his size, can be carried so as never to be in the way, and the manual of the litter is simplified. After experimenting with both methods I am now inclined to give preference to the individual sling.

8th. When the litter is not in use it is desirable not only to close but also to strap it for carrying or packing purposes. This strapping is variously done; the French use the shoulder slings which are wound around the folded litter and somehow buckled together; this primitive method is not satisfactory. The English have improved upon it by having a small cross strap fastened to each sling so that when the latter is laid along the poles the strap can be passed and buckled around the litter at each end. In our regulation litter the cross strap is part of the litter and entirely independent of the sling; this is the correct principle but the difficulty is in its best application; if the strap is placed below the poles, on a level with the braces (as in the regulation litter), it is much in the way and liable to be broken in working the braces; for this reason I would prefer to place it above the poles, immediately beneath the canvas, the free end passing

through a slit in the canvas; perhaps a still better way is to have the strap revolving on a pivot-button under one of the poles and, when not used, laid alongside the pole and the end secured to another button.

A question upon which there is a division of opinion is that of the litter-pillow. The French litter has an arrangement by which the edge of the canvas is raised (so as to make a head-rest) when the braces are set. In the German litter the head-rest is a separate framework adjusted by rack and pinion. The English ambulance-litter has a wedge-shaped, horsehair pillow, but it is kept, and only used, in the ambulance. As to myself, I believe that a permanent pillow is convenient but unnecessary and that it is best to have both ends of the litter exactly alike and interchangeable so that either may be placed at the head or feet of the patient as it happens to be. The English method of keeping two pillows in the ambulance, for use therein, is good and ought to be imitated in our service. In the field, on the way to the ambulance-wagon, it will be easy, if desirable, to improvise a pillow with the coat, blanket or knapsack of the patient, or the pouch of the bearer.

Of the manual of the litter, as incorporated in the Drill Regulations of the Hospital Corps, I only intend to say very few words. During the last ten years it has undergone many alterations, but all on the line of progress; it is not yet perfect, but even with its shortcomings I feel free to say that it is decidedly the best ever produced in this or any other country. It comprises the most approved methods of manipulating and carrying the litter, closed or open, empty or loaded, of handling the wounded, loading them upon or unloading them from the litter, loading the litter into or unloading it from the ambulance. In all these movements the comfort and safety of the patient are always first considered.

All authorities agree that a litter must be served by a squad of four men, forming 2 reliefs; 2 men bearing the litter, the other 2 walking by each side of it, or exceptionally the 4 men taking hold and carrying together. The most intelligent and best trained man of the four is made chief of squad.

In order to have a basis for a computation of the work which a litter is capable of performing on the battle-field, I have marched

squads carrying loaded litters a measured mile over different grounds. In one experiment the march was on hard prairie soil, up and down low foot-hills, over a 5-foot fence and four times across a rather deep but dry irrigating ditch. It was accomplished in 26 minutes. In a second experiment the march was on the level, ploughed soil of a farm without other surface obstacles than small irrigation trenches and ridges, but half way against a strong wind; it was accomplished in 23 minutes. On the completion of the mile the bearers were somewhat tired but in condition to proceed, and would probably have carried their patient a second mile in about the same time. These experiments permit us to assume that, under ordinary circumstances, a well-trained squad will be able to walk half a mile with empty litter to where the patient lies, apply a simple dressing, load the patient and march back to the dressing station in half an hour; and, if under stress of time, will be able to dispose of two patients in one hour. However, after the first two or three patients, the squad will need rest and be unable to proceed at the same rate; probably it is safe to say that, whenever it has more than three or four patients to attend to, an average of 45 minutes should be allowed for the first dressing and transportation of each, provided they do not lie more than half a mile from the dressing station, so that ten patients would require 7 or 8 hours of laborious work.

AMBULANCE.

The Corps has done some very commendable work in the field, by two horses. It provides transportation for eight men sitting, or two recumbent on litters, or four sitting and one recumbent. It is fitted with four removable seats, which, when not used as such, are hung two against each side, thus answering the purpose of cushions. The floor is $7\frac{1}{2}$ feet long and 4 feet wide. Beneath the driver's seat is a box for the medical and surgical chests, and under the body are two water tanks; outside on each side, are two brackets upon which litters are carried."

The ambulance, like the litter, should be strong, light and of simple construction; all movable parts should be easily and readily manipulated and not liable to get out of order; being constructed

for the specific purpose of accommodating the litter it should not be any longer or wider than this purpose requires. In our old pattern regulation ambulance, not yet quite superseded, the litters were laid, and pushed in, upon a set of rollers resting upon springs, so that the patient had the benefit of two sets of springs; this has been recognized as a superfluity. The plain floor is good enough, as in our present regulation ambulance, although it could be improved by the addition of four thin steel bands sunk into it upon which the litter legs could more readily slide; a further simple improvement would consist in having these steel bands only supported near the middle so that the litter resting upon them would have the benefit of their elasticity.

The ambulance, also like the litter, should be one and the same for all purposes. The French have two kinds of ambulances, a light one for two recumbent patients and a larger one for four recumbent patients or 10 sitting. So far as I know, all other nations have only one kind and, like ours, intended for two recumbent patients.

In addition to the medical and surgical chests under the driver's seat, the ambulance should carry no less than four closed litters on outside brackets, two lanterns (with red and white glasses) and, inside, a pouch or bag full of ordinary dressings (such as cannot be carried in sufficient quantity in the chests) and two small flags or guidons, one with the national colors, the other with the red cross of the Geneva Convention.

Our new pattern regulation ambulance has good points and is an improvement on its predecessors, being simpler and lighter, but remains open to the following criticisms:

It is too high—high enough to admit two tiers of patients, but as this is not contemplated the roof could be advantageously lowered with corresponding reduction of weight.

The patient being introduced into the ambulance head foremost, as required by the drill regulations, after two loaded litters have been so introduced, it is impossible to reach the head of either patient to give him a drink or for any other purpose. I never knew of a satisfactory reason for loading a patient head foremost; it is the French,

English and American way, and therefore we may assume that it has advantages, but to my mind these are more than offset by the disadvantages. I believe, with the Germans, that loading by the feet is the proper way.

The removable seats which, when not used as such, are hung against each side of the ambulance, are always a source of trouble and bad temper; they are secured by means of hooks and slots, and it generally happens that these do not exactly correspond in size or place, or at least do not work smoothly. A much simpler and better system would be to have the seats on hinges; then they are simply raised up against the sides and held there by bolts.

The brackets on the outside should be made longer so as to carry two litters instead of one, or four in all. Litters are in such great demand on the battle-field that the only safe rule is to have too many in order to have enough.

There is no special provision for the arms, clothing and accouterments of the wounded. A few small articles may be slid under the stretcher, but a rack or netting fitted to the side or roof would prove very useful for the purpose.

Lastly, the driver's drawer is quite too small for any practical usefulness. It should be large enough to contain not only a few necessary tools, but also rations and articles of clothing.

THE ORGANIZATION, EQUIPMENT, INSTRUCTION AND DRILL OF THE AMBULANCE CORPS (HOSPITAL CORPS) OF THE MASSACHUSETTS VOLUNTEER MILITIA.

BY CAPTAIN MYLES STANDISH,

Ambulance Corps, Massachusetts Volunteer Militia.

The Geneva Convention of all the nations of Europe, held in Geneva, Switzerland, in 1864, and subsequently modified and amended in another convention held at the same place in 1868, made a formal series of rules for the neutralization of hospitals and ambulance corps.

This code was subsequently formally adopted by nearly all the civilized nations of the world, including the United States.

This code provided, among other things, for the organization of ambulance corps for the care of the wounded upon the field of battle, and in the hospitals, and it was agreed that a corps of men should be specially enlisted in every army for this work. That they should be considered by all nations as neutral; that they should be unarmed; and that they should wear upon the arm a white armlet bearing a red Geneva cross, the form of the badge being a compliment to Switzerland, the nation under whose authority the convention was held. The flag of Switzerland is red, bearing a white equal-armed cross, so the convention reversed the colors and made the red-cross flag.

The organization and neutralization of this corps is the high-water mark of civilization and humanitarianism in warfare. The convention did more than simply specify that this corps should be considered neutral, and that it should wear a distinguishing badge, but definitely stated that wherever the white flag bearing the red cross flew, be it over a building used as a hospital, over an ambulance, wagon train, or ship, that building, wagon or ship, should not be fired upon; that the men of the ambulance corps should not be made prisoners of war; that they could remain upon the battlefield after the retreat of their defeated army; and that after the special emergency of the immediate care of their wounded had passed, they should be returned within their own lines under the direction of the general of the victorious army, but that he may, if he chooses, not deliver them to the army immediately in front of him, but return them within their own lines at some distant point. The agreement further states that, owing to the existence of this privilege within the enemy's lines, the men enlisted in an ambulance corps should be picked men, sober and patient under taunts and ridicule.

Such then are the specified requirements of the personnel of every ambulance or hospital corps, whether of the army or volunteer militia.

Under this convention there was organized in the army of the United States in 1887, the present Hospital Corps, but previous to that Massachusetts had organized its Ambulance Corps in 1885. As at that time there was no model in this country to go upon, its drill, methods, and organization had to be struck out *de novo*; and

as a consequence, our equipments, drill, organization, and methods, were evolved to fill the requirements of a militia organization, and are, we believe, peculiarly adapted to the necessities of the National Guard. Therefore, it seemed to me that a paper describing the Massachusetts Ambulance Corps would be of service to other States in attacking an entirely new problem.

Now let us consider what actual duties fall upon the Ambulance Corps of the National Guard. In the first place it has very little true hospital work, differing in this respect from the Hospital Corps of the Army, but does have a large amount of emergency work, first aid, and litter bearing. The care and transportation of men who fall in long parades or reviews overcome by the heat or exhaustion; the care of cavalry and artillerymen with more or less serious injuries and broken bones, due to accidents caused by green horses rendered frantic by the unaccustomed music and noise of artillery discharges. It has also to do with civilians crushed or otherwise prostrated in the enormous crowds in attendance upon great parades in large cities, and it has to do this work in small detachments under the charge of its own sergeants, who have to assume the responsibility of life and limb until a medical officer can be secured. Moreover, the procurement of a medical officer may be a matter of considerable time in the face of a struggling crowd or a frantic mob. Therefore, the Ambulance Corps which I have the honor to command is exhaustively instructed in all first aid work; there is a lecture each winter upon each of the following subjects: The Bones, Muscular System; Circulatory System; Ligaments; Fractures; Dislocations; Burns and Scalds, including electrical injuries; Splints; Bandaging; Wounds; Antiseptics and Dressings; Poisons; Infection and Hygiene; Unconsciousness and Asphyxia, including the resuscitation of the apparently drowned; and upon all these recitations are also held, as you will see further on. Now, if the men of my corps are up on all these subjects theoretically, the next thing is to be sure that when they come for the first time face to face with an actual case, they shall be able to apply this knowledge properly and with the least delay, in spite of the excitement of the occasion. To accomplish this means discipline, and discipline in the militia means military drill.

It is just at this point that the equipment and manual of the regular Army Hospital Corps fails to give us what we need. Their organization is for a great part, from the necessities of the case, divided up into small detachments doing the duties of nurses in hospitals; the men are, to a great extent, men who have previously served in the line, and moreover, they are under the daily supervision of their medical officers; discipline comes to them in the air they breathe, and its necessity is not felt as a factor to steady the men in a sudden excitement; therefore the drill prescribed for them, consisting of marching in line without stretchers, and such movements as are necessary to change from a line to a column of fours, and back again to a line, in addition to placing and carrying patients upon the litters, and marching with what is practically the formation with open litters, is all sufficient. But in an organization like the National Guard, where discipline must be established and maintained solely by weekly or bi-weekly drills, mere marching in columns of fours in addition to litter bearing, does not give enough military tone and snap to the men, nor does it offer enough variety to accustom the men to doing promptly what they are ordered to do, no matter what the order may be.

This necessity has been one of many reasons why we prefer the litter which you see before you. It is divided in the middle of its length, and each half suitably encased in a canvas covering constitutes a "kit," which can be handled in the same manner as a rifle, and with this we have only to adopt the infantry tactics, and we can add all the military movements we choose to our drill.

The fact that emergency duty is always detached duty, necessitates in an ambulance corps a large number of non-commissioned officers, for we have found in Massachusetts that although the regulations under which we drill say that No. 1 man shall command the squad of four men with a litter, as a matter of fact his orders are much more promptly obeyed if he wears a corporal's stripes, or if the whole squad is under the command of a sergeant. Formerly we had an ambulance corps attached to each brigade, and we have from time to time changed the number of enlisted men, the number of ser-

geants, added corporals, etc., but now we have combined both the organizations into one corps, under the direction of the Surgeon General. This corps now has one Captain, two Lieutenants, seven Sergeants, ten Corporals, and forty-one privates. This is the equivalent in enlisted men, of a full company of infantry, under the Massachusetts law. In spite of this large corps, it does not seem expedient to us to adopt the infantry company tactics without change, and drill the corps exactly as if it were an infantry company, and for this reason: the greater part of the actual work is done in detachments, a squad of four men and a corporal are ordered to report to the commander of a battery for some special duty; or a detachment of twelve men in the charge of a sergeant are sent to accompany a regiment in a mock battle; or a lieutenant and twenty-five men, including sergeants and corporals are assigned to be a brigade on its tour of duty; and if there is a mock battle these men are sub-divided again under sergeants, and sent to attend the various regiments of the brigade. In all of these instances it is evident that the squads will be under the ultimate command of a non-commissioned officer, therefore it seems to us necessary that they should be accustomed to obeying orders from their non-commissioned officers, and so we have organized the new consolidated corps in the following manner:

The whole corps is divided into two divisions, each under the instruction and charge of a lieutenant, who is a medical officer, but for purposes of military drill in the armory, each division is under the charge of its senior sergeant. Each division is again divided into two sections, each in charge of a sergeant, and the drill is then substantially the drill of an infantry company, drilled in platoons, with the sergeants in the positions of captain, and 1st and 2nd lieutenant. The corporals act as right and left guides of the platoons, and as No. 1 men of the middle fours. This organization enables us to detail any part of the corps, and send it away, without its losing its accustomed formation. A division under its lieutenant and its own non-commissioned officers; a section under its own sergeant, and a squad of four men under its own corporal. By this system in an emergency details can be made with the utmost rapidity.

We are adapting from the new infantry tactics at the present time a new manual of drill to take the place of the old manual adapted from Upton.

As with our manual, the matter of equipment has also been a series of experiments, and the result is that our present outfit consists of that which we have found good, having discarded those things which in practical work we have found bad or of no value.

The first and most striking peculiarity of our equipment is our litter. It is made of hickory poles four feet long, with handles for the bearers at one end, and at the other end one of the poles is prolonged by a heavy brass tubular sheath or socket, while the second pole is bound with a brass tubing that will just push into a tube of similar size to the one on its fellow pole. Between the two poles is the canvas which extends from the handles to the brass joints just described. To form the litter two of these sections are pushed together. The spreader which is fastened to one pole of each section by a swing joint is then swung against the opposite pole and pushed into place, making the canvas taut.

The advantages of this stretcher over the ordinary stretcher for our work are many. First and foremost, the fact that each half of the stretcher made up in its case can be used in a manual in the same manner as a rifle, which, as I have said, is a tremendous aid to discipline. Secondly, it is much more easily transported when not in use, in ordinary railroad trains, street-cars, etc. Third, men with these kits at right shoulder can make their way through crowds with great facility where it would be next to impossible to go with the ordinary stretcher. Two men can respond to an emergency call on the line of march of a great parade, with the ease and alacrity with which the corporal of the guard goes to a call from an outpost. The same ease is experienced in getting quickly through a thick wood, filled with underbrush, where it is extremely difficult to carry a long litter rapidly. Fourthly, an advantage that has helped us out of many a tight place, our lowest unit for stretcher work is a squad of two men with a litter, which doubles our effectiveness in an emergency, over a system of drill in which the lowest unit is a squad of four men

with one stretcher. And finally, it is light, and there is nothing on it that can be lost, broken, or bent.

The peculiar construction of this litter gives two pieces of canvas, with an opening of about four inches in the center of the litter. This we have not found to be a fault, but rather an advantage. It is not a fault, because it causes no discomfort to the patient; and it is an advantage in carrying a patient up or down a steep, narrow flight of stairs, upon which the litter can not be held level, for in that case the principal part of the weight coming upon one piece of canvas depresses it lower than the other piece, so the patient's weight when the litter is inclined is thrown against the turned-down edge of the second piece of canvas, and the patient is thus prevented from sliding down upon the lower bearer. This fact could, I am sure, be utilized in constructing a litter which would be of great service in handling wounded men aboard ship. The opening also furnishes a place for Nos. 1 and 4 men of the litter squad to grasp the pole firmly, and to the best advantage assist in carrying it. Which fact alone is a matter of considerable importance, when it happens, as it recently did with us during a fall field day, that a heavy man with a broken leg had to be transported two miles through the woods upon a litter. We do not have any bearer straps attached to the litter, preferring to have them part of the duty uniform, as is a man's belt. By this means the ambulance corps man always has his strap with him when on duty, and if his stretcher has already gone to the rear in an ambulance, and he has to improvise another stretcher and take out yet another patient, he still has his bearers' strap to ease his arms on the march to the rear. I have had it said to me that these litters are not strong enough for actual service. In practice we have not found this to be the case. This litter has seen nine years of actual service, and in that time has had some pretty severe tests. On one occasion in the First Brigade of the M. V. M., one hundred and fifteen men fell prostrated with the heat in fifteen minutes, and we had a quarter of an hour of such active work as I hope and believe we shall never see again. In that fifteen minutes we took eighteen men to the regimental hospitals behind the line in the ambulance, and twenty-five more were carried to quarters on these same litters, in addition to going to a still

further number and determining that they were not unconscious and would be able to walk back to quarters in a few moments. Pretty lively work for an ambulance corps which had only fifteen men on the field, and those men stretched out behind a line of troops which contained twenty-five hundred men, even taking into consideration the fact that the line was drawn up immediately in front of its own quarters.

In the nine years this litter before you has been used, it has had actual service in the field which is equivalent to a campaign of two months, in addition to armory drills and parades. In these nine years we have never broken but one litter, and that did not break at the joint, but at a knot in the wood near the handle. There is but one real objection to this litter, and that is the fact that it has no legs, so that when a patient is lowered he rests upon the ground, be it damp or rocky or dry. This disadvantage we deem is, for our purposes, much more than offset by its many advantages. Moreover, if the bearers exercise a little discretion in the selection of a spot to lower the litter, the patient need never really suffer from this defect in the litter.

In addition to his "kit" and the bearer's straps, each man carries a pouch containing a stout clasp knife, a pair of scissors, a small bottle of aromatic spirits of ammonia, a small bottle of whiskey, a small box containing a few tablets of corrosive sublimate, two roller bandages, and four triangular bandages. Formerly we carried these in a cloth haversack, but it was found that the contents were easily dampened and spoiled in active work in wet weather, and lately we have substituted a leather case attached to the waist belt, which is of the size and shape of an old-fashioned cartridge box. In addition we carry the ordinary equipment of an infantry soldier, canteen, haversack and knapsack.

Having determined our method of organization, and the best style of equipment for a corps destined to do its work in the National Guard, the next question that came up for the decision of the Commanders of the Massachusetts Ambulance Corps was, what shall these men be taught, and how shall the time be divided between lectures, practical first aid work, i. e., bandaging, splinting, the work-

ing out of original problems with given material; and military drill? After many experiments I have settled down on the following programme which is sufficiently varied to keep the attention of the men during a long evening's work:

1. A ten minutes' quiz conducted by a sergeant upon the subject of the previous lecture.

Now a sergeant, in order to conduct a quiz and keep the respect of the corps, must know a little more about the subject than the men he is quizzing, consequently the sergeants are compelled to make themselves very proficient in all that pertains to first aid work.

2. In the programme comes a lecture by the lieutenant in charge of the division upon some one of the subjects in the list before given. This occupies from twenty minutes to half an hour.

3. A practical demonstration of some bandage, or splint, or improvised litter, by a private of the corps.

Assignments for each drill night of the whole winter are posted in the autumn so that each man has time to prepare himself so that his particular demonstration shall be a success. Original work in these demonstrations is urged, and received with every encouragement that the commanding officer is able to offer.

4. There is a military drill, including stretcher work, for half an hour.

Military courtesy and discipline are strictly maintained at all stages of the evening's work, and at the close of the evening comes the business of the civil organization which underlies the membership of the corps.

In camp, in addition to the actual work which the emergencies of the tour of duty require, the drills are principally ambulance drills, with some original work in the woods, improvising stretchers and horse litters.

The results of all this work are now beginning to tell. We have found out in Massachusetts what kind of an ambulance corps we want, and what we want it to be able to do, and we are fast arriving at the practical knowledge of the best methods to attain the standard of efficiency which we wish.

The corps has done some very commendable work in the field, as I have above hinted, and on one occasion has shown its usefulness to the civil authorities as follows:

Upon the occasion of the 1890 Encampment of the Grand Army of the Republic there marched through the streets of Boston one August day sixty thousand veterans of the late war, and the streets were lined with a multitude of sight-seers, estimated to have been five hundred thousand people.

On that occasion Major O. H. Marion, Surgeon of the First Infantry M. V. M., organized a medical service for the day. The Ambulance Corps of the First and Second Brigades, M. V. M., volunteered for duty. First aid stations were placed at about two blocks apart throughout the entire line of march. Each station was marked with the red-cross flag, had a telephone and was manned by a policeman and a detail from the Ambulance Corps. The militia ambulance, and all the police and hospital ambulances, were pressed into service and stationed at central points. During the day a large variety of calls were responded to from these stations. There were people crushed and trampled upon by the crowd, epileptics, broken bones, and numerous other causes for disability. There were fifty calls from these stations for ambulances, and it was always a matter of pride to the medical staff of that day that the longest interval between the ringing of the telephone and the arrival of the ambulance was not five minutes. Such a day's work as that would in itself justify the organization and maintenance of an ambulance corps in the National Guard of every State in the Union. It is needless to say that the result above stated was not attained without hard work on the part of both officers and men, and one medical officer was in the saddle for twelve continuous hours of that day.

Thus I have outlined to you the work and methods of the Ambulance Corps of the Massachusetts Volunteer Militia. Our ideals are much higher than the standards I have to-day outlined, and if we ever attain them I will read you another paper upon some future occasion.

A LITTER FOR MILITARY USE.

BY CAPTAIN F. J. IVES,

Assistant Surgeon, U. S. Army.

Permit me to preface these remarks with an apology for presenting this time-worn subject, my chief excuse being the belief that the development of the present military litters has rendered them more suitable for garrison uses and drills than for the practical work on the field of battle.

I shall endeavor to show that in actual warfare we must go back to first principles and encumber our sanitary corps as little as possible with heavy, complicated paraphernalia, and also that by thus simplifying the litter, not only is the effective fighting force of the command increased, but the wounded and helpless are far more efficiently and speedily removed beyond the line of fire to places where their injuries can receive proper attention. This is a subject upon which much has and can be written, but I shall merely attempt to trace a bare outline of such salient features as most forcibly present themselves and trust to your generosity to forgive all sins of omission and vagueness of detail.

The transportation of the wounded on the battlefield is for the most part accomplished, primarily, by utilizing the manual labor of troops, whereby the unfortunate ones are collected in some safe rendezvous and, secondarily, by means of wagons, boats, cars, etc., their subsequent removal to the regularly established hospital is effected. The usual apparatus employed in the first method above enumerated can be divided into two classes: The extemporaneous contrivances devised on the spot, and more comfortable and serviceable stretchers to be regularly issued by the government for such purposes: I shall confine my remarks as to the nature of such appliances to the latter class, as the valuable little manuals published and issued to the Army, from time to time, have so admirably and ably described the various impromptu schemes for carrying the wounded, that further comments are superfluous.

On the advanced line of battle the most primitive methods of conveyance must prevail, it being furthest from the base of supplies, usually unaccompanied by wagon transportation of any kind, and the men comprising it being encumbered by little else than their arms, ammunition and accoutrements. Here the fact that necessity is truly the mother of invention receives practical demonstration, and when the time for gathering the wounded arrives we find in many cases little more than willing arms for bearing their sad burdens. Properly instructed, however, these arms are taught to carefully lift and carry off their charges, whilst others improvise rude litters and thus we reach the dressing station.

This work is done principally and necessarily by levying details from the fighting force with only such primitive means as are available, for the reason that an efficient rifle is too valuable to be laid aside for the transportation of a litter, and detachments of the hospital corps fully equipped for service cannot be supplied in sufficient numbers to meet all the requirements of battle. These latter would prove a tempting target for the enemy's artillery and sharpshooters, as their duties render them dangerously conspicuous and casualties amongst their own number would soon cripple them as an efficient organization. Therefore the members of the hospital corps will, as a rule, be first encountered at the dressing station, where we find the first systematic formations for the removal of the wounded.

As the litter is an intrinsic portion of the equipment of the sanitary department, we will find few, if any of them, on or near the line of battle whilst the fighting is actually in progress. Experience has taught with what alacrity the uninjured soldier volunteers to transport his wounded comrade to the rear and his tardiness to rejoin the ranks; therefore the presence of all the appliances of transportation would add but an additional temptation for the ranks to be unnecessarily depleted of healthy men, and for the transportation of many wounded soldiers still capable of proceeding unaided to the first dressing station. This latter class there is every reason to suppose will be much larger in future than in past wars, owing to the character of wounds caused by latest improved firearms. A large proportion of the future wounded will unassisted get from under

fire when they find they are, by reason of their wounds, no longer able to fight and that the enemy's bullets are uncomfortably near.

Whilst fighting is actually in progress, except in permanent earth-works, it would in most cases be unadvisable to attempt to gather in all the wounded and take them to the rear, therefore means should be devised by which this could be done most expeditiously as soon as the conditions are such as to render it possible. These conditions are so numerous that space does not permit a discussion, but we will assume that the firing has abated sufficiently to enable an organized effort to be made without exposing the search parties to unnecessary danger.

It is of paramount importance at this time, or sooner if an opportunity permits, that means be adopted by the Medical Department whereby litters in sufficient quantity to supply the requirements of the various commands be rapidly conveyed to the front and distributed for use at the dressing stations. As the facilities for transporting these, either by hand or wagon, are naturally very limited all efforts in their construction should tend towards such lightness and reduction in bulk as is consistent with strength and serviceability. This brings us to the consideration of the chief qualities we must aim to obtain in the construction of a practical field litter, which qualities must adapt themselves to two conditions: Comfort for the patient and saving of strength for the bearer. To favor both patient and bearer equally is an impossibility, so each must be considered at the expense of the other and all efforts should tend towards attaining such a medium as will prove most advantageous to the command.

The following features are generally recognized as essential: Strength, cheapness, lightness, simplicity of construction and compactness—these to be so combined as to render as safe and comfortable a conveyance for the wounded as possible. In order to meet these requirements, I have had constructed a stretcher which will be submitted for your inspection and criticism. No originality is claimed in its chief features, the main object in rehashing old ideas being a protest against the present cumbersome articles with which we are furnished.

The litter here presented claims to be nothing more than the

simplest form of hand litter, and all appendages for superfluous and unnecessary comforts are discarded. It consists of two handles separated by two detachable braces, and a litter-bottom which can be readily removed and replaced. This latter is of light canvas 6 feet by $21\frac{1}{2}$ inches with a hem on each side sufficiently roomy to permit the free passage of the pole and attached brace. The handles are bamboo poles from $1\frac{1}{2}$ inches to $2\frac{1}{2}$ inches in diameter, $7\frac{1}{2}$ feet long, with the extremities, if necessary, slightly tapering, to permit a more comfortable grip. About nine inches from each extremity of the pole a clamp consisting of two cast-iron curved sections with straight extremities each resembling a flattened U is attached. These sections are immovably fixed to the pole by means of bolts and thumb-screws, but are so constructed that on a pole over $1\frac{1}{2}$ inches in diameter the flattened extremities cannot approach nearer than $\frac{3}{8}$ inches. The cross-piece of the brace consists of a round iron rod of sufficient size to readily resist bending, 16 inches long and flattened at both extremities. One of these flattened ends has a circular hole through which passes one of the above-mentioned bolts, thus attaching the cross-piece to that end of the handle and making a perfect joint, enabling it to fold against the pole when the litter is closed. The other extremity of the brace, instead of a hole, has a T-shaped slot which latches into the corresponding bolt of the free clamp on the opposite handle. Thus each litter-pole, when complete, has a handle with two clamps, a brace being attached to one and the second being free. The sections of these clamps, the bolts, thumbscrews and cross-pieces are similar—can be easily removed and readily replaced by others if necessary.

From the above brief description it will be seen that the novel feature presented is the utilization of bamboo for handles. This useful and commonplace article, on account of its well-known toughness and lightness, is admirably adapted for this purpose—properly seasoned and uninjured pieces, $1\frac{1}{2}$ inches in diameter and $7\frac{1}{2}$ feet long, will possess sufficient strength to safely carry a patient weighing 200 pounds. Its natural pliability gives sufficient spring to counteract the discomforts of jolting, in sharp contradistinction to

the constant jarring of the unyielding wooden poles. Its lightness removes many useless pounds from the weary bearers and this latter quality is claimed to be its chief virtue.

Besides the above, bamboo presents the good quality of cheapness, one of the most reliable importing firms in Chicago having informed me that in lots of one thousand pieces of the required size its cost would not exceed \$15.00 per thousand or thirty cents per litter.

The use of bamboo, on the other hand, presents several disadvantages, the chief of which are its destructibility and the necessity for its importation. The latter obstacle is easily overcome, but the former presents more serious features. A crushing weight, the passage of a wagon-wheel, a heavy blow, the perforation of a bullet and other similar accidents, only too common in the rush and confusion of battle, would in all probability destroy or seriously impair our bamboo pole, whilst those made of solid wood remain unimpaired. These elements of destruction would at first sight effectually condemn its use, but when we consider that its cheapness and lightness not only place large quantities in the store houses, but enables large numbers to be rapidly transported and available, thus readily enabling broken and useless handles to be rapidly replaced by sound ones, it must be admitted that this obstacle is not particularly formidable.

The present litter weighs from eight to nine pounds; will not exceed \$1.50 in cost; is of sufficient strength to efficiently transport a patient weighing over 200 pounds; has, when loaded, a comfortable and easy motion; is, when closed, compact and handled with facility; and from its extreme simplicity of construction less liable to get out of repair or broken, and should such occur can be rapidly and easily restored, as in actual service an extra supply of all the component parts should be available at the ambulance station, so that any missing or broken part could at once be replaced.

It had been claimed that the adoption of two styles of litters, hand and ambulance, was undesirable on account of the frequent danger or serious discomfort occasioned by the necessary shifting required to remove the patient from one to the other. This objection cannot be raised with the litter under discussion for the reason that

the transfer of a dangerously wounded patient to one of the regular ambulances can be readily accomplished by merely resting the litter upon the ambulance-litter, unlatching the braces and withdrawing the handles, leaving the litter-bottom under the patient. Subsequently the canvas bottom is disinfected, washed and reissued, in the meanwhile the bearers supplied with a fresh one.

Another objection liable to be raised is the absence of any form of rests or legs—and this is a point admitting of considerable discussion. It is generally conceded that all litters provided with rests are far more comfortable than without them; by acting as a cot the patient's comfort is much enhanced, he being elevated above the possibly damp, muddy or irregular ground. But is this a necessity? Does the presence or absence of legs cut any figure in the hand transportation of the wounded? Is it essential to add many pounds to an already over-weighted article in order to make it what it was, never the original intention that it should be?

With this litter an attached set of rests would be unadvisable, not only on account of the addition to the weight, but principally because any fixtures of that nature would greatly weaken the structure owing to the destructibility of bamboo. To drill holes or in any way destroy the integrity of this material would render its durability very uncertain. However, I have an idea to be later elaborated of light easily detachable legs, for use at such stations only where, on account of lack of facilities, the patients are left to lie on their litters until other accommodations can be provided. This state of affairs is liable to exist at the ambulance station, field hospitals and during railroad and steamboat journeys.

Whilst convinced that these remarks fail signally in doing justice to the subject they are submitted, nevertheless, with the hope that whereas this litter is imperfect in many respects, still it may be considered a step in the right direction, that as a practical field equipment its advantages may counterbalance its disadvantages.

THE U. S. ARMY AMBULANCE.—ITS ADVANTAGES AND DEFECTS AS SHOWN BY ACTUAL SERVICE.

BY CAPTAIN J. D. GLENNAN,

Assistant Surgeon U. S. Army.

I wish to present a few notes on the transportation of sick and wounded by the ambulances now in use in the Medical Department, giving the advantages and defects in these wagons as brought out by personal observation, with the view of obtaining a more perfect ambulance wagon.

A number of patterns of ambulance wagons have been in use in the Army, and many improvements and changes have been made in the wagons, and in the methods of carrying the patient from the earlier models, in which the patient was placed on permanent mattresses or cushioned seats in the ambulance to the later ones, in which the litter on which the wounded man is brought from the field is used to carry him in the ambulance, but I do not think that a satisfactory wagon for the transportation of wounded has yet been obtained by the Medical Department.

In the two-wheeled Coolidge ambulance, recommended in 1859 there were mattresses on the floor of the wagon, with apparatus for making double inclined planes. The use of a two-wheeled wagon could not be satisfactory, and any ambulance, in which the patient is not carried on a litter, is difficult to load and unload.

In the Wheeling ambulance, used during the war, there were seats along the sides of the ambulance, and, hanging from these, seats which could be brought to the level of the side seats, meeting in the middle of the ambulance, making a bed for two, or, if necessary, three patients. The space under the seats was utilized for the water keg, litters, patients' effects, and other articles. The weight was about 800 pounds.

In this ambulance the height of the bed from the floor increased, in a great measure, the jolting, and it had many disadvantages in loading. The best place is near the floor of the ambulance.

In the Rucker ambulance, also used during the war, there were two tiers of litters, the lower litters running on elastic rollers, and folding on a longitudinal hinge-joint, served as seats, when not in use for reclining patients; the two upper litters, joined by hinges at the sides of the wagon, formed backs for the seats when down, and met in the middle of the ambulance, when raised, forming a platform for two patients. The weight was about 1120 pounds. This was an improvement on the older ambulances.

The ambulance which has been in use in the Army since 1881, is familiar to all. It is large and heavy, sometimes called by Quartermasters "a mule killer," but it is a comparatively easy ambulance for wounded, particularly when used enough to give some elasticity to the springs,—not too new, nor too old. It has a large floor space; leather cushioned seats and backs; lateral floor springs, on which wooden rollers are placed, which support the litter six inches from the floor; a box under the driver's seat, and an inside box large enough to contain patients' effects, panniers, instrument cases, and other necessary articles. The litters are 6 ft. 2 in. long, by 1 ft. 10½ in. wide, have sliding handles, and folding legs, and are a different size from the old field litter, and the new combined field and ambulance litter.

The water keg is under the driver's seat. The weight of this ambulance is about 1500 pounds. The principal defects are first and mainly its heavy weight. It is entirely too heavy for quick or long work. The same strength can be obtained with much less weight. It is long-coupled and wider than ordinary civilian wagons; its wheels will not take their ruts, which fact increases jolting. It has a very defective pattern of brake, which is nearly always useless. The seats do not remain fixed, either packed or when prepared for use, so that they frequently fall on a patient on a litter, or from under one sitting.

In 1892 a new ambulance was adopted by the Medical Department, designed to remedy the over-weight and other defects of the model of 1881.

In the early part of 1893 one of the new patterns was sent to the field hospital at Carrizo, Texas, for trial, and was used there for several months, with one of the old pattern. This hospital supplied

medical service for six cavalry camps at points from eighteen to forty miles distant, and the ambulance was given a fair field trial.

This ambulance has the following advantages over the older one, first, its lighter weight, making greater speed possible, though four mules are still necessary for field use. The patient is carried without transfer from the field litter, the ambulance has a good brake, the seats remain secure when prepared, and the driver's seat is protected from sun and rain; but there are a number of defects and disadvantages.

The lighter weight has apparently been secured partly by leaving out the inside box of the old ambulance, with the cut-out for the front wheel, and raising the body of the ambulance slightly and lowering the front wheel, but the body of the ambulance is now too high to make transportation comfortable, the decreased width also adding to the jolting effects of a high wagon, and the front axle is too low to pass over the stumps of trees that are common in the roads in many parts of the country. The height exaggerates every motion, so that it is a rough-riding, uncomfortable wagon. Every inequality of the road is exaggerated, and a man needs the full use of hands and feet to ride on the seats, a man with an arm in a sling would be at a disadvantage. The motion is less, of course, on the floor, but it is much greater than in the old ambulance.

There are no cushions for the back. The straps do not at all serve the purpose, and one gets a severe blow occasionally. The catch for securing the seat hook in the lower slot works very well, but the upper slot is not protected, and the seats are thrown loose when packed. The method of securing the seats when prepared for use is good, but the slot at the hinge end of the upright support should be cut entirely through the floor, so that it can not be clogged with dirt.

The absence of a box to carry patients' effects, panniers, etc., is a serious defect; there always are effects to be carried.

Two tiers of litters are not possible. The height of the driver's seat is an advantage in handling four mules, and it is the most comfortable place on the ambulance. The tongue needs more play than is given in the ambulance as sent out, and had to be changed before

it could be used. The sliding water boxes under the body of the wagon get out of order easily, and did not prove satisfactory. Whether it was due to the pattern or to the workmanship, the ambulance did not stand wear and tear. It was used for speed and to save the mules, but for the comfort and welfare of the patient the older ambulance was used.

It can be used in posts or on smooth roads, but it does not compare with the older ambulance for wear or for the comfortable transportation of wounded.

A satisfactory ambulance should be light and strong, easy for patients and for the animals drawing it, so that speed may be made without discomfort to the patients or injury to the draft animals. With a good ambulance shaking is not materially increased while traveling at a trot, if proper stops for ruts are made. It should be large enough to hold two patients comfortably, carry their effects, a surgical pannier if necessary, the water keg and necessary articles for the driver, and receive the litters in common field use, and be arranged so that a third or fourth litter can be suspended above the lower ones if necessary; it always is necessary in actual service.

I think that an ambulance can be made somewhat on the type of the model of 1881, low set, roomy, of much lighter weight, and embracing the smaller improvements of the new pattern, which will approach very nearly the ideal ambulance.

THE TRAVOIS—A NEW SANITARY APPLIANCE IN THE FIRST LINE OF BATTLE-FIELD ASSISTANCE.

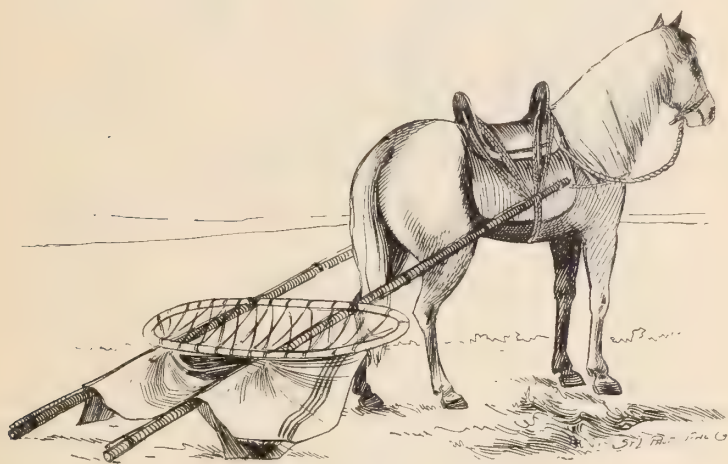
BY MAJOR JOHN VAN R. HOFF,

Surgeon U. S. Army.

History is silent as to the origin of the travois; but it is not difficult to imagine that it is the most ancient of vehicles intended to be drawn by animals; its very form would indicate this. The origin of the name is equally obscure; but it is probable that the French trappers of early days christened this primitive means of transport, as they gave name to many another thing which they found among our aborigines.

The lodge-poles with which the red men pitch their habitations serve to form the vehicles upon which their belongings are carried, when they

“Fold their tents, like the Arabs
And as silently steal away.”

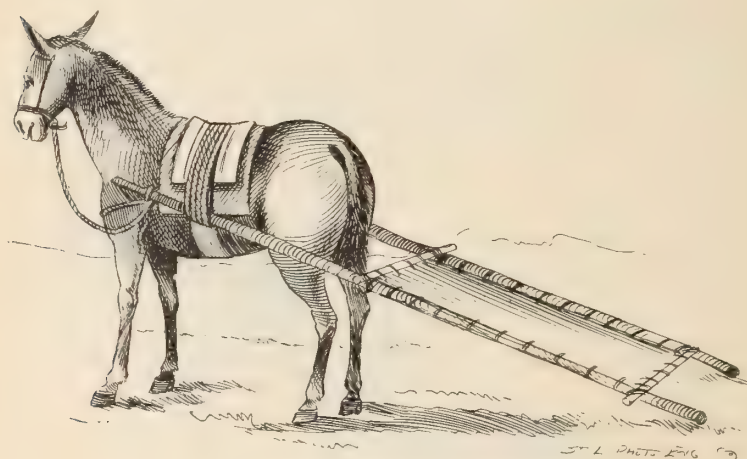


Dakota Indian Travois.

The plains Indians use, for lodge-poles, straight saplings of thoroughly seasoned pine or ash wood, which they trim down until they measure about 30 feet long, by $2\frac{1}{2}$ inches at the butt, and $1\frac{1}{2}$ inches at the top. In making the travois several of these lodge-poles are lashed together at their large ends with rawhides, and then are

fastened at their lashed ends to a pack-saddle, in such manner that an equal number of poles trail backward on either side of the pony, the small ends resting upon the ground.

The frame of the couch is made of ash, is somewhat elliptical in shape, and the bed is a network of rawhide lashed to the frame, strand by strand. Its dimensions are about 3 feet by 4 feet. The couch is laid lengthwise across the poles, and lashed thereto so that its upper side is about 1 foot from the pony's tail. A blanket, lashed to the lower side of the couch, completes the travois. It will be observed that the long elastic poles make admirable springs for the couch, and that any jar communicated to them is well distributed before it reaches the passenger.



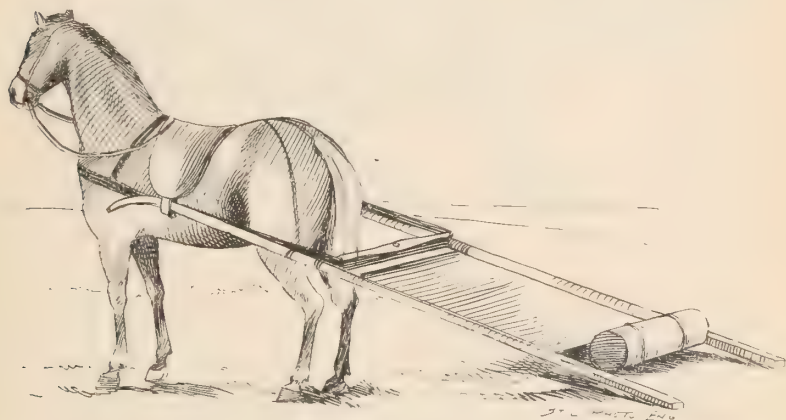
Extemporized Travois.

A less satisfactory apparatus is made by taking two poles about 16 feet long and 4 inches in diameter, at the butt. These poles are laid nearly parallel to each other, being separated, $2\frac{1}{2}$ feet in front and $3\frac{1}{2}$ feet in rear, and are connected by a cross-bar about 6 feet from the front ends, and a second 6 feet back of the first, each notched at its ends and securely fitted into, and lashed at, the corresponding notches in the poles. The space between the cross-bars is filled in with canvas or other material, which makes the couch. The front ends of the poles are securely fastened to the saddle of the animal,

and the rear ends drag upon the ground. To lessen any shock communicated to the apparatus, in passing obstructions, one pole is made a few inches shorter than the other.

A breast strap and traces should, if possible, be improvised and fitted to the animal.

Based upon the principles above outlined, a number of very ingenious traveaux have been constructed by Army officers, the object of which is the transportation of sick and wounded over countries impassible to wheeled vehicles. Among them may be mentioned those of Greenleaf, Cleary, Girard and McDougill.



The Cleary Travois.

The three former resemble each other in principle, all having jointed poles, with separable cross-braces, which permit of their being dismounted and compactly packed, and the Greenleaf and Girard traveaux, are intended to carry the regulation hand litter. They, however, differ in numerous important details.

The Greenleaf travois will be referred to *in extenso* when considering a new application of this kind of apparatus.

The McDougill travois, the invention of Capt. Thomas M. McDougill, U. S. A., differs from the others mentioned, in being a fixed apparatus. Each pole is a single piece 18 feet long, permanently attached to its fellow by cross-pieces mortised into the poles. A canvas bed hinges to the front cross-piece at its head, its foot resting

upon two rods of sufficient length to make the bed horizontal. A folding carriage top covers the head of the bed, and a waterproof apron, extending from it, is fastened over the foot, thus securely protecting the passenger from the weather.



The McDougill Travois.

The writer knows from personal experience that this is an extremely comfortable vehicle. A serious objection to it, however, is the space occupied by it in its own transportation when not in actual use. The problem of transportation is of the utmost importance, and it may be laid down as an axiom that only easily transportable sanitary material will be transported in war.

But a more important question than the carrying of the few wounded in Indian combats, over countries inaccessible to wheeled vehicles, may be solved by this form of conveyance: and it is to this question in its relation to the travois that I would particularly ask your attention.

A recent publication commenting upon the deadliness of modern ordnance, says: "But the most sweeping changes will be required in the provision of the Medical Staff, Sanitary Equipment, and battle-field aid of future military armaments. Medical Officers will suffer so much from the fire of the magazine rifle, that a large surgical

reserve will be needed to replace those shot down while attending the desperately wounded."

Undoubtedly the picture is painted in somewhat lurid colors, possibly the dangers in future wars may be vastly beyond those of past times, perhaps the numbers of wounded will be greatly in excess of previous records, but my own opinion is that it will take just as many pounds of lead to kill a man in the battles to come as it did in those whose history is written.

Nevertheless, while we can only surmise as to the future, it is of the utmost importance that, so far as possible, we should be prepared to meet every demand made upon us. Certainly it needs no argument to prove that the sanitary arrangements for the field should be on an equal footing of efficiency with the offensive means of an army, and yet how often is such the case? The hand litter is the corollary of the rifle and the ambulance wagon of the gun—when one is used the other is needed. My distinguished and lamented preceptor Billroth, whose name and fame are the common heritage of us all, pertinently asks: "Are steps being taken to improve the means of aid to the wounded in proportion to the increasing development of destructive agents?" Speaking of the possibilities he says: "Now as to the greater length of the trajectory of the new projectile you may ask, what does that matter? Put the dressing stations a few hundred paces further back. If they were, say 500 paces to the rear before, then they will be 700 or 800 paces to the rear now; quite so; but for the bearers who have to carry a heavy man upon a litter this increased distance means not only an immense increase of labor, but it also makes the journeys much longer in point of time; consequently far fewer wounded can be transported from the battlefield to the dressing station in a given time * * * * The increased number of wounded, therefore, must entail a great increase in the number of bearers. Yes, we must even come to the conclusion that in future wars it will no longer be possible to remove the wounded from the field, by means of bearers alone, unless the work is to go on for days together. Hence, it will be necessary to place

a great number of light carriages even close behind the line of battle for the purpose not only of transporting the wounded to the field hospital, but also to get them away from the battlefield itself, providing the ground admits of it." But the ground will scarcely ever admit of it, even if the "great number of light carriages" were available, which, of course, they never will be. Mr. Furley says: "It appears to be the impression in some quarters that wherever a gun-carriage can be driven there also an ambulance wagon can be taken. * * * * I have never known an instance in which the removal of wounded to ambulance wagons was not more speedily performed by having the wagons on the roads * * * * and carrying the wounded on stretchers to the wagon stations; * * * * certainly this plan saves an agony of suffering to the patients."

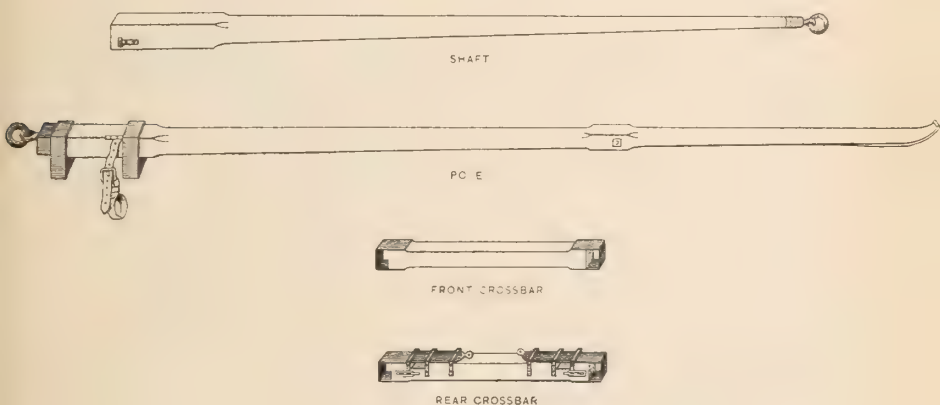
How then are the wounded to be collected? Someone has suggested wheel litters; but the impracticability of this proposition lies in the fact that these litters in their turn will require transportation, granting that even if at hand they could be used in a rough country or over ploughed fields.

Longmore, in concluding a very interesting chapter descriptive of various forms of hand wheel litters, and of the experience of the British Army with this means of transportation, says: "It is unlikely, however, that this class of conveyance will ever form part of the equipment for field service again."

From the foregoing we may conclude that up to the present time no practicable solution of the question of first line of assistance (battlefield) work in future wars has presented.

As a contribution to the subject, which I venture to think is of importance, I will ask your attention to the simple appliance known as the Greenleaf travois.

This travois, perfected by Lieut. Col. Charles R. Greenleaf, Deputy Surgeon General, U. S. Army, is a vehicle that is primarily intended for transporting the sick or wounded in countries or under conditions where the use of wheeled vehicles or other means of transportation is impracticable.



GREENLEAF'S TRAVOIS.

SCALE: $\frac{1}{2}$ " = 1'

The Greanleaf Travois—Dismounted.

It consists of a frame having two shafts, two side poles and two cross bars, upon which a regulation litter (hand) may be rested and partly suspended. When in use a horse or mule is attached between the shafts and pulls the vehicle, the rear ends of the poles of which drag on the ground. One pole is slightly shorter than the other, in order that in passing an obstacle the shock may be received successively by each pole, and the motion equally distributed over the entire structure.

The material of the travois is second growth ash wood, the attachments of malleable iron.

The parts are as follows:

Front cross bar.....	weight, $3\frac{1}{2}$ pounds.
Rear cross bar, with bolts.....	weight, $6\frac{3}{4}$ pounds.
Two shafts	weight of each, $8\frac{3}{4}$ pounds.
Long pole	weight, $16\frac{1}{4}$ pounds.
Short pole	weight, $15\frac{1}{4}$ pounds.
Total weight.....	$50\frac{1}{2}$ pounds.

The entire apparatus packs in a bundle 9 feet long and 1 foot in diameter and can be conveniently carried upon the brackets of the ambulance wagon.

PROPOSED TRAVOIS DRILL.

The squad being in line, the commands are given:

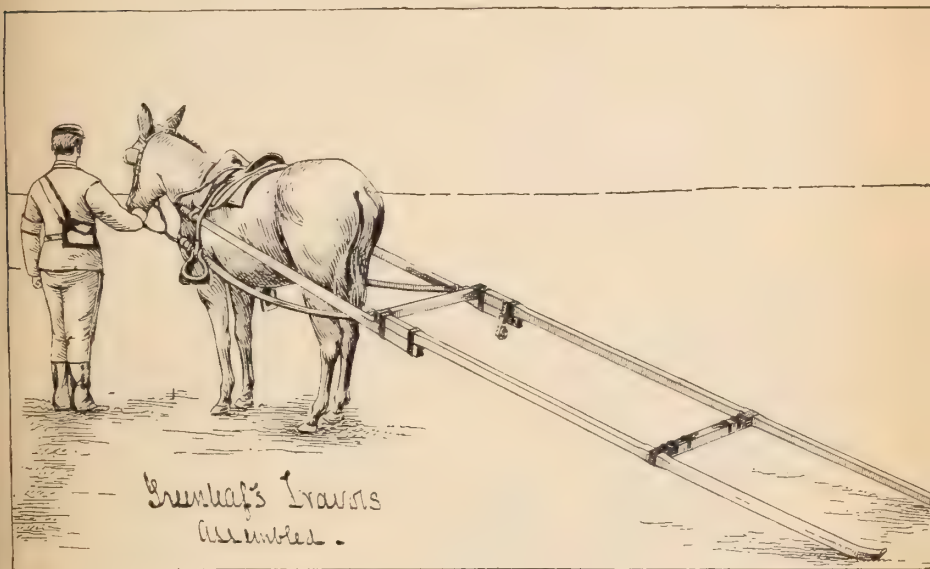
1. *Procure Travois*, 2. *Right [or Left] Face*, 3. *MARCH*.

At the first command Nos. 2 and 3 step one pace to the front; at the second command they face as directed, and at the last command go to the packed travois and returning with it (in the position of "Carry Litter," par. 62, D. R.), place it upon the ground in front of their squad, and at right angles thereto, when they resume their posts.

1. *Prepare*, 2. *TRAVOIS*.

The squad take posts as in par. 127, Drill Regulations (by "four prepare to lift"), Nos. 2 and 1 on the right and 4 and 3 on the left, and pull the shafts forward through the collars on the side poles until they are fully extended. Nos 2 and 4 then place the front cross bar over the front ends of the side poles, driving it home until its collars strike the front collars of the side poles, while Nos. 1 and 3 pass the collars of the rear cross bar (keeping uppermost the surface upon which are the flat bolts), over the rear ends of the poles, pushing the bar forward until it reaches the squared places (intended for its

site) and passes the bolt slots in the poles, when they throw the barrel bolts into place and, if necessary, open the flat bolts.



1. Hitch, 2. TRAVOIS.

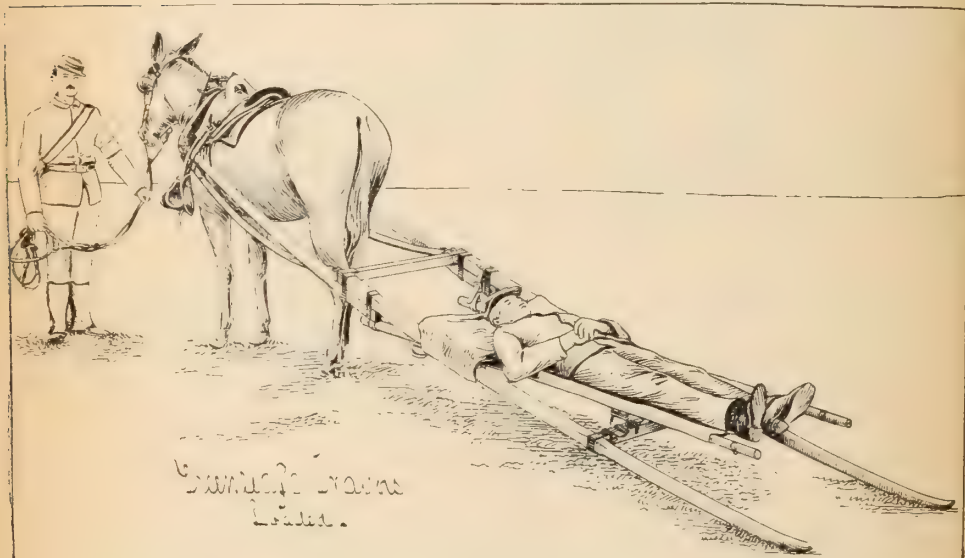
The travois may be prepared by two bearers by reversing movements described under "pack travois."

No. 4 takes charge of the animal, Nos. 2 and 3 attach the travois. The front of the travois is raised and the animal is placed between the shafts. If he has on an ordinary wagon harness, the rings on the front ends of the shafts are put over the iron hooks on the hames, and the toggle of each trace chain is fastened to the ring at the front end of the corresponding side pole. If the animal is saddled with the military saddle, the ring on the front of each shaft is fastened to the pommel of the saddle by means of the straps that belong there, and the shafts are secured by a surcingle passed over all. The saddle should have a breast strap, or one must be improvised. With other patterns of harness or saddles the same rules should, as nearly as practicable, be followed. The travois being hitched. No. 4 takes

charge of the animal and the other bearers resume their posts at the litter, which being lifted, the commands are given:

1. *Take Post to Load Travois*, 2. MARCH. 3. HALT, 4. *Lower Litter*.

The squad proceeds to the travois; upon approaching it the litter is wheeled about so that the head of the patient is toward the rear of the travois, and two paces from it, when, at the 3d command, it is halted, and at the 4th lowered.



1. *Prepare to Load*, 2. LOAD.

At the first command the slings are "secured," No 2 stands fast, No. 3 steps around his left handle and takes post at the patient's left shoulder. No. 1 takes post opposite No. 3; all facing the litter stoop, No. 2 grasping his handles, and Nos. 1 and 3 their respective poles. At load, the three bearers slowly raise the litter and carry it lengthwise over the travois.

Nos. 1 and 3 slip the handles at the head of the litter through the leather loops attached to the front ends of the travois poles, and secure the legs at the foot of the litter in the mortises, by the flat bolts, when they resume their posts.

At the commands:

1. *Prepare to Unload Travois*, 2. **UNLOAD**, 3. **HALT**, 4. *Lower Litter*.

Nos. 1 and 3 slip back the flat bolts, and take their posts at the right and left shoulder of the patient, respectively. No. 2 takes his post between the handles at the foot of the litter. At the 2d command they lift the litter and carry it clear of the travois, when it is halted and lowered.

The travois may be loaded or unloaded by two bearers who, for this purpose, take posts opposite each other mid-length of the litter, and lift it upon or off of the travois by grasping the side poles.

The travois being unloaded:

1. *Unhitch*, 2. *Pack*, 3. *Return Travois*, 4. **MARCH**.

At the first command the travois is unhitched by Nos. 2 and 3, and the animal is led out by No. 4. Nos. 2 and 3 working on their respective sides remove first the rear, then the front cross bar, and place them beside the right and left poles, respectively; they then slip the right shaft back until it lies beneath its pole, then the left shaft in like manner, when all are secured in a single package by the cross straps. At the last command, the travois is returned by Nos. 2 and 3, who then resume their posts in line.

The members of the squad on duty with a loaded travois will retain, approximately, the posts taken at the litter when loading.

Rank may be formed from the travois, as from the litter. (Par. 70, D. R.) * * * * *

Upon the arrival of the ambulance wagons at the dressing stations, the traveaux can quickly be taken therefrom and prepared. The horses ordinarily used by the non-commissioned officers of the bearer companies on the march, and which in action would not otherwise be used, could be attached each to a travois, and the hand litter opened and mounted, when the appliance would be ready for use.

Three men are required with it, one to lead the horse, the others to assist the patient, load the litter, and place it upon the travois. When returning with a load the two bearers march one on either side of the patient to lift the rear end of the travois when passing an obstacle, or over unusually rough ground. It will be observed that the laborious work is all done by the horse, and the bearers are free to devote themselves to the patient.

It is not claimed that this is an ideal means of transportation; it is no more or less comfortable than a wheeled vehicle, but it has these great advantages:

1st. Its compactness in packing and light weight enable it to be brought upon the battle-field under any conditions of service.

2d. Its strength of material and simplicity of construction insure its integrity and ease of manipulation.

3d. It can be taken wherever an ordinary hand litter can be carried, and where wheeled transport would be altogether inadmissible.

4th. It substitutes the horse for the human bearer and thus insures a continuity of work not possible with the latter alone over the enormous distances the wounded must be carried.

RAILWAY TRANSPORTATION OF SICK AND WOUNDED.

BY COLONEL LOUIS W. READ,

Surgeon-General Pennsylvania National Guard.

The advantages offered by railways for the transportation of sick and wounded were practically but little known prior to our late war. Although at an early stage of the war the facilities offered were adequate to requirements of the military service, yet the method or means employed for placing sick and wounded in cars and arranging for their comfort was experimental. It required, however, but a limited experience in the medical and quartermasters' departments of the army to adopt successfully a system that has been the basis, with but few modifications, of the one recognized and utilized by European and other armies.

The literature of railway transportation of sick and wounded of the late war refers to the battle of Wilson Creek in Central Mis-

souri, in August, 1861, as the first occasion or necessity for resorting to cars for conveying sick and wounded to general hospitals. The wounded after that action were concentrated at Rolla, the southwestern terminus of the St. Louis Railroad, and aggregated several hundred. The freight cars available at that place were fitted up for their transportation to the St. Louis hospitals. Various expedients were employed to adapt the cars to the requirements of the different classes of patients. For the seriously wounded, or those to be conveyed in a recumbent position, seasoned tent poles were shaved down to give them as much elasticity as was compatible with requisite strength, and secured transversely near the roof through holes in the sides of the cars. Ropes were attached to these and to the floor, and held suspended two lines of field stretchers. This plan required constant attention to prevent accidents.

Another method consisted of placing a double row of stanchions on each side of the car at intervals of seven or eight feet apart. To these posts three tiers of litters were securely lashed. In other cars rough wooden bunks were built along the side of the car, floored with elastic slats and filled with straw. In all cars used for this purpose large window spaces were sawed out of the sides and ends to afford free ventilation.

In the summer of 1862 four brigades stationed at Newberne, North Carolina, suffered from malarial fever to such an extent that general hospitals or sanitarium were established on the sea coast at Carolina City, a point connected with Newberne by a railway forty miles long. The patients were conveyed in freight cars, the floors of which were covered with dry pine tags supplemented with a layer of loose hay or straw. Bed sacks were placed on this substratum, and the patients were transported with comparative comfort.

Medical Director Jno. Letterman, U. S. A., records the transfer of nine thousand sick and wounded over the Aquia Road on June 12, 13, 14, 1863. Loose hay and straw covered the floors of freight cars, and those most seriously wounded were carried to the cars on the beds they occupied in the hospitals; these were placed on the substratum of hay and straw.

Medical Director E. P. Vollum, U. S. A., has recorded that after the battle of Gettysburg, July 1, 2, 3, over fifteen thousand wounded were sent to Baltimore, York, Harrisburg and Philadelphia. They were transported in freight cars, the floors of which were liberally covered with hay.

After the battle of Olustee, February 25, 1864, the wounded of the Union Army numbered over eleven hundred. Assistant Surgeon John H. Janeway, U. S. A., reported that the grave cases of compound fractures and penetrating wounds of cavities and indeed all the more seriously wounded were transported on the Mobile Railway in freight cars bedded with pine boughs, palmetto leaves and a small allowance of straw covered with blankets. The train moved slowly over a distance of fifty miles, and the patients who had undergone amputation and others severely wounded complained but little of the rough method of transit.

In the campaigns about Chattanooga, Medical Director George E. Cooper, U. S. A., reports that in emergencies when the regular hospital train was overcrowded resort was often had to transportation in freight cars, the floors bedded with dry leaves.

In a letter to the Surgeon General of the Army, January 7, 1863, Surgeon A. K. Smith, U. S. A., describes a car fitted up by the Philadelphia & Reading Railway Company for the transportation of the seriously sick and wounded. The internal arrangements were similar to sleeping cars, with the exception that the berths were made to slide in and out, and two men could carry one of them with its patient to an ambulance wagon or nearest hospital. The berths were comfortable stretchers. The car had fifty-one berths, and a seat at each end for an attendant. It proved to work very well. Subsequently a number of cars were constructed from this model and ordinary day coaches were converted to hospital requirements, and freight cars also of special construction were soon in operation on all lines of railway running from the front to Baltimore, Harrisburg, Philadelphia and New York. Although differently fitted up they all secured a comparatively comfortable mode of transportation for recumbent patients.

The hospital cars fitted up by the United States Sanitary Commission were arranged in accordance with plans furnished by Dr. Elisha Harris. A model of these cars was exhibited at the Paris Exposition, 1867. These cars were about fifty feet in length, with a passage-way extending through the middle to the doors at either end. On either side of the passage-way were eight upright wooden posts three inches square, connecting the floor and ceiling, and so placed that the distance apart should correspond to the length of a field stretcher. At a distance somewhat less than the width of a field stretcher, opposite each pillar, another post of like dimensions was placed next the side of the car. Thus one side-pole of a stretcher was attached inside the wall pillar and outside the pillar next the passage-way. Wooden pegs inserted into the posts served for the attachment of large rubber rings which secured and supported the ends of the stretcher poles. Thirty-two stretchers could be suspended for recumbents, leaving a space in the middle for a store and seats for attendants or wounded who could travel in a sitting posture.

When the Army of the Potomac advanced to the Rapidan the Medical Director of the Department of Washington, Surgeon Robert O. Abbott, recommended that a hospital train of twelve cars, one for a dispensary and storeroom, one for the surgeon and attendants and ten for sick and wounded, should be constructed on plans and specifications prepared by Assistant Superintendent of Military Railroads, I. McCrickett. It was designed that this train should run between the advance of the Army and the hospitals of Alexandria and Washington and should supersede the freight cars bedded with hay or straw that had hitherto been in use. The McCrickett hospital car was forty-five and a half feet long and eight and a half feet wide, intended for the transportation of fifty or sixty patients, thirty in couches and thirty in chairs. The stretchers or couches, which were two and a half feet wide, were arranged in three tiers on each side of the passage-way. The lower tier was permanent and had mattresses placed on them. The inside poles of the stretchers were suspended by leathern straps secured to earlings. The outside handles were supported by hooks of spring steel. A door three and a half feet wide gave ample room for ingress and egress of loaded stretchers.

It was with the Army of the Cumberland with its line of communication extending hundreds of miles away from its base of supplies that the utility of railroad transportation in relieving the army of its disabled men was most conspicuous. Although freight cars were used for very severe cases, several trains of hospital cars of special construction were prepared at the government work shops for transporting patients in the recumbent position. In 1864 there were three hospital railway trains, each consisting of ten or twelve cars, connecting the advance of the army with Nashville and Louisville. In each train one car was fitted up exclusively as a kitchen and storeroom, another as a dispensary and accommodation for medical officers, and with an ample supply of medicines, stores, instruments and appliances. These cars had been prepared at Nashville under the direction of the Western Sanitary Commission. Each car accommodated thirty-two recumbent patients. The pallets were placed in tiers of three, supported by iron brackets attached to the sides of the car and swung on india rubber springs. The bed frame resembled stretchers with the handles cut off. Acting Assistant Surgeon Barnum, who had charge of the trains, reports that during his connection with the railway hospital service he supervised the transportation of twenty thousand four hundred and seventy-two patients and lost but one.

Medical Director George E. Cooper, U. S. A., preferred an arrangement of the ordinary first-class passenger coach. The cars of this class were usually fifty-five feet long and nine feet wide, and on either side a row of fourteen double seats. The beds were made by removing alternate seats and connecting the remaining ones with slats of sponge wood. Two bed sacks were laid on these slats. The cars thus prepared had a capacity for thirty-three patients. The upper berths were framed as stretchers and hooked to the side and ceiling of the cars and covered with mattresses. This plan was found to be the best, the least expensive and the most comfortable to the patients of all hospital cars in use. Ventilation without exposure to draft was well provided for by windows in the elevated part of the ceiling and valvular openings near the roof.

It has been already shown that the adaptation of freight cars for hospital purposes by securing field stretchers to rows of stanchions was practiced at a very early period of the late war, but the merit of devising a simple and effective method of suspending the stretchers by rubber rings was exclusively due to Dr. Elisha Harris.

There will probably be many changes and improvements in the methods of moving wounded by railways, but the idea of utilizing the ordinary field stretchers and keeping the patients on them until they reach a fixed hospital will not soon be abandoned. This system was much commended in Europe.

Assistant Surgeon George A. Otis, U. S. A., in his book on "Railway Transportation in Time of War," says: "Few published statements have appeared respecting the transportation of sick and wounded in the Confederate Armies."

Dr. Chisholm, in his "Manual of Military Surgery for the use of Surgeons of the Confederate Army," makes no allusion to transport by railway.

Assistant Surgeon Otis also says: "I have been favored with a brief memoranda on the subject from several medical gentlemen who had the best opportunities of obtaining accurate information respecting it."

Dr. Samuel Preston Moore, Surgeon General of the Confederate Army, states, August, 1875: "Freight and open box cars were used to transport our wounded from the field to the hospitals. The cars were bedded with straw or leaves, whichever was most convenient. The method was found to be objectionable on account of the bedding becoming foul and unpleasant and was discontinued and blankets were placed on the floor when they could be procured. Stretchers were not used. Passenger cars were not used for severely wounded or sick, freight and open box cars being preferred. The Confederates had no regular system of hospital trains."

Dr. Hunter McGuire, Medical Director of General T. J. Jackson's Corps, remarks on the subject: "We used freight cars in transporting sick and wounded, using straw or dry leaves for bedding. Stretchers were very scarce and occasionally an officer or badly wounded man was permitted to take one away. Passenger cars were

sometimes used; planks were fastened on the tops of the backs of the seats; these were covered with beds. All sorts of intended comfort was improvised by attendants from the limited means at command. There were no ropes or rubber rings in stock. There were regular trains once a day or oftener from the field to post hospitals and were furnished with such supplies as would serve in emergencies."

But a history or description of the foreign methods shall be the subject of a future paper.

As there are a great number of important papers to be read at this meeting I have decided to postpone the consideration of foreign railway transportation of sick and wounded for a future paper.

TRANSPORTATION OF THE SICK AND WOUNDED ON BOARD SHIP.

BY ALBERT L. GIHON, A. M., M. D.,

Medical Director United States Navy.

I have nothing to add with reference to the transportation of sick and wounded men on board ship to what I have already stated in a paper which first appeared in the volume of "Hygienic and Medical Reports by Medical Officers of the United States Navy," Vol. IV., pp. 1013-1023, published by the Bureau of Medicine and Surgery, Navy Department, Washington, D. C., 1879, and some ten years later, under the caption "Transportation of the Disabled on Ship-board" in Wood's "Reference Handbook of the Medical Sciences," (Vol. VII., pp. 238-241).

For the benefit of military and especially naval medical officers, who may not have read these reports, I may be permitted to repeat the statements therein made.

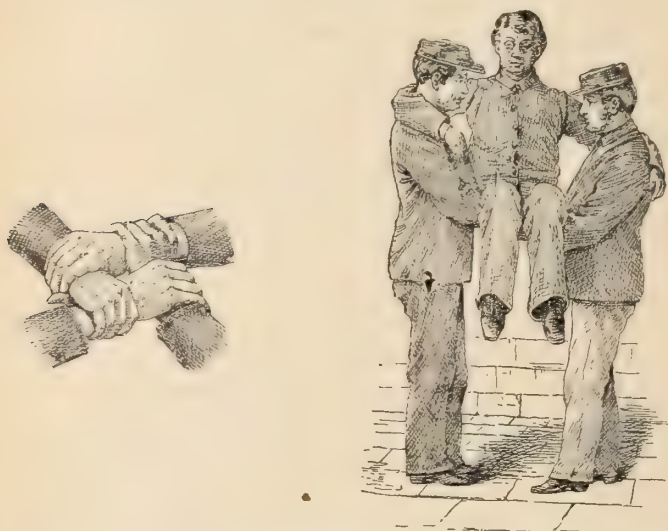
The transportation of the sick and wounded in military operations on shore depends so much on circumstances of time, place, and character of force engaged, that it has not been thought possible to provide an apparatus or appliance available for every possible occasion. Where the regular field ambulance could not be used, as when small bodies of men operate on detached service in wild countries, the ingenuity of the medical or other officer in charge has been

depended upon to improvise, from such material as might be at hand, some sort of carriage or means of transport that would meet the exigency of the moment. Whence the number of single and two-horse and mule litters, *litières*, *cacolets*, *paniers-a-dossier*, *aparejos*, and pack-saddles devised for expeditionary service, and the simpler extemporized stretchers, *travaux*, *travois*, or *travees*, which the emergencies of our military service among the Indians have caused to be constructed. The many varieties of these devices by medical officers of the United States Army have been admirably described and pictured by the late Major George A. Otis, Surgeon, United States Army, in his report to the Surgeon-General of the Army "On the Transport of the Sick and Wounded by Pack Animals" (Circular No. 9, War Department, Surgeon-General's Office, Washington, 1877).

On board ship the necessities and conditions are so uniform that there is no such need for dependence upon temporary expedients. It is possible to meet the several purposes required, which are (1) the transportation of wounded men from the spar and gun-decks during action, and men accidentally disabled at other times, through a narrow hatchway to the cockpit or sick-bay on a lower deck; (2) the sending wounded or injured men down from the tops to the spar-deck, and thence below to the cockpit or sick-bay; and (3) the transportation of the sick and wounded from the sick-bay to the spar-deck and thence over the ship's side into a boat, by which to be taken on shore, landed and carried to hospital. Various apparatus have been proposed serving one or all these purposes, but they are little known outside the navy. In the passenger and merchant services, in which no provision is made for them, occasions requiring them occur so often, that an apparatus adaptable to every possible need is a desideratum.

The method of carrying the injured or invalid upon the hands of two strong men, crossed after the fashion of the "lady's chair" of children's play, on which the person sits with legs dangling, supporting himself by his arms around the bearers' necks, or, when unable to do this, being held in place by other assistants, answers where there is no confusion, when the decks are unobstructed and the wide quar-

ter-deck ladder is in place, and when the inferior extremities are not severely injured or the sufferer does not otherwise require especially tender handling or support; but when this is the case, and when the ladders are unshipped or are not wide enough for two men to descend abreast this method will not answer.



Under these latter circumstances the ordinary "hospital cot" has been for years the only means available on board most naval vessels for purposes of transportation, and often, when most quickly needed, this could not be got ready. Even when one is required to be kept constantly rigged, it was not unusually occupied by some bed-ridden invalid, who could not be displaced, and, the necessity arising for another, the carpenter's mate or his assistant had to be summoned to gather the several pieces of the clumsy frame from their place of stowage in some distant corner of the hold, or perhaps under the hammocks in the nettings. When found these would seldom fit together and when fitted, more time was consumed in the slow process of lacing a canvas sacking six feet long around the wooden frame, and adjusting the latter thus covered within the cot proper, of which the sides had then to be laced together; the whole forming, when all was done, an ill-contrived canvas box, usually too

short for the occupant and not easily handled and carried. It was never suitable for lowering a wounded man through a small hatch, the utmost care on the part of four or five assistants being often unable to prevent the patient from sliding down to the end of the cot, perhaps upon a fractured leg or thigh, or, especially when helpless or unconscious, from pitching out headlong.

Medical Inspector, now Medical Director, Albert C. Gorgas, U. S. Navy, in 1864, devised an improvement of the "hospital cot" intended to obviate some of these objections, and his cot has been in use on board many vessels of the United States Navy. Its chief peculiarity is a leather-covered double inclined plane, raised and lowered by a hinged center and made to catch upon a wooden ratchet attached to each side of the lower half of the cot frame. The thighs



Gorgas's Ambulance Cot.

and legs being flexed over this plane, its upper surface sustains the weight of the body when the head of the cot is elevated, while a narrow leathern band, passed through two long leathern or canvas loops nailed to the upper crosspiece of the frame, is tied around the chest under the arms, and prevents the tilting forward of the body, which is also partly supported by the breast strap. Dr. Gorgas claims for his cot that it permits passing a man almost perpendicularly through a small hatchway. [*Vide Wilson's Hygiene—McDonald's Hygiene.*]

Surgeon, now Medical Director, Henry M. Wells, United States Navy, some years ago proposed an ingenious modification of the ordinary ship's hammock, by which it may be used in certain cases for the carriage of the sick and injured. Two long strips of canvas

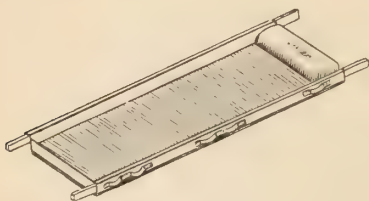
were sewed diagonally across the under surface of the hammock, terminating on each side in rope handles by which it could be carried, the patient resting on mattress, blankets, and pillow; but even when wooden stretchers were attached to each clew of the hammock this



Wells's Hammock.

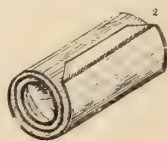
apparatus was at best a makeshift, since it lacked the rigidity which can only be secured by a solid frame, and without which it can not, with safety or comfort to the patient, be used to swing him over the ship's side into a boat, or to support him during his passage on shore.

Dr. Wells himself, recognizing these defects, subsequently improved his apparatus by taking a piece of stout canvas, six feet long and twenty-two inches wide as the bottom of the cot. Another piece, of lighter quality, is stitched to the lower side of this transversely, at intervals of one inch, and between these stitchings are inserted strips of hickory wood, to stiffen the cot laterally. A strip of canvas six and one-half inches high, and doubled, is sewed to the sides of the canvas



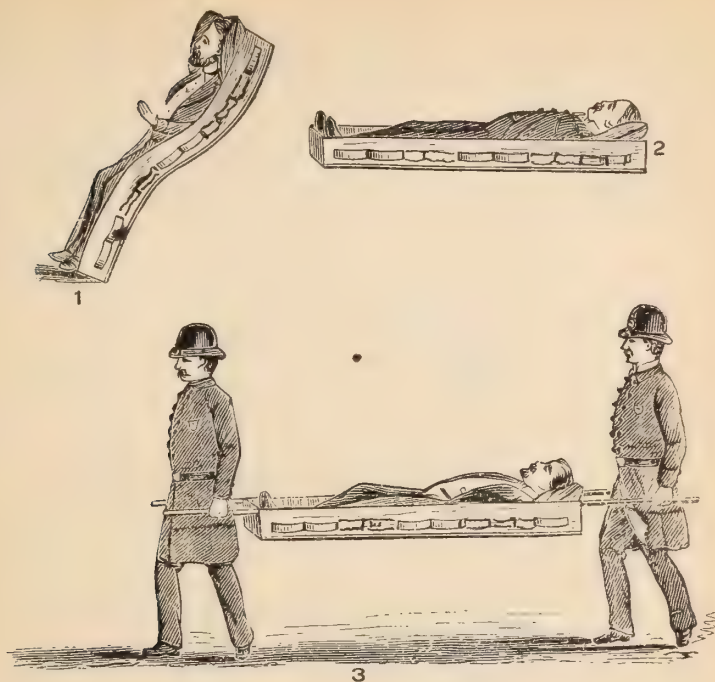
Wells's Improved Ambulance Cot.

1. Ready for use.



2. Rolled up.

bottom, through which poles are run when it is used as an ordinary stretcher. Along the sides of the cot are ten canvas handles, which enable the bearers to transport the patient at any angle required by his condition, sitting or reclining.



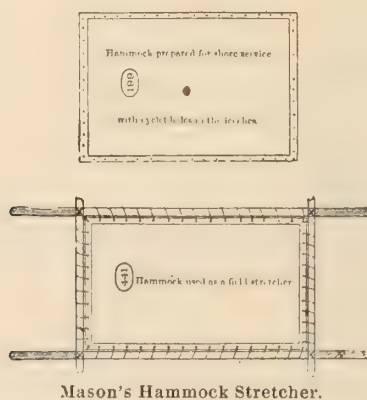
1. Patient carried at an angle. 2. Without the poles. 3. With poles as police and army stretcher.

Notwithstanding these very great improvements, this cot is still unsuitable for the descent or ascent of badly injured men through narrow passages or at very great inclinations.

Lieutenant T. B. M. Mason, United States Navy, has suggested a method of utilizing the ordinary ship's hammock for ambulance service with landing parties. Eyelet-holes are worked along both leeches of the hammock, as well as across its ends, permitting it to be laced and stretched upon a wooden frame made of two long poles and two transverse stretchers of proper length.

While this and the other apparatus described will serve as useful expedients under many circumstances, when other means are lacking, it is important that provision should be made in every vessel belonging to the Government, and appropriately supplied to every passenger and merchant vessel, to meet whatever exigency may at any time

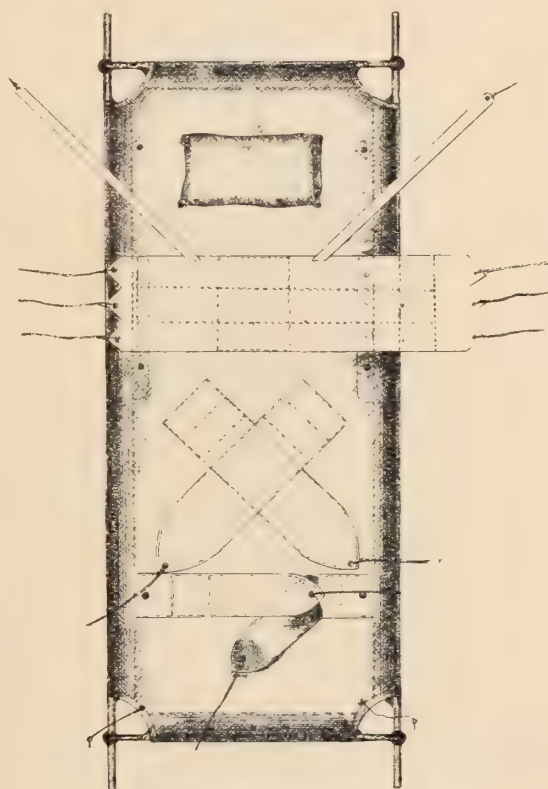
occur, requiring, as stated at the outset, the safe and comfortable carriage of any sick or wounded individual from aloft, from on deck to sick-quarters below, or from below through a small hatchway to the deck above, the whipping him over the ship's side into a boat in a seaway, and his transportation to the shore and thence to the side of the bed he is to occupy in the hospital, without change of conveyance from the time he leaves his cot in the ship's hospital or sick-bay.



I have proposed to meet all these requirements by the Ambulance Cot bearing my name, which was submitted by order of the Navy Department, to a board of officers composed of Captain (now Commodore) Oscar C. Badger, Medical Director (afterward Surgeon-General) F. M. Gunnell, and Past Assistant Surgeon T. D. Myers, who on July 5, 1877, reported as follows:

"We have carefully examined the Ambulance Cot submitted to us, and have to report that it seems to accomplish all that was proposed by Medical Inspector (Medical Director) Gihon in planning it. It enables a man to be lowered endlong through a hatchway or from a top without falling out, the band around the breast preventing him from falling forward, the bands under the thighs supporting his weight. If the legs be injured, there are additional bands to confine them. The cot also permits a man to be swung over a ship's side in a heavy seaway, and landed in a boat without danger of falling out. He is to remain in the cot in the boat, the elastic side-pieces making

a comfortable spring-bed. On shore he can be placed in any kind of wagon, the ends of the side-pieces being placed on any sort of support, and the springing of these side-pieces will prevent jarring. If there is no wagon about, two or four men can take hold of the extremities of the side-pieces and walk away with him to his bedside in the hospital. When not in use the staves and stretchers can be un-

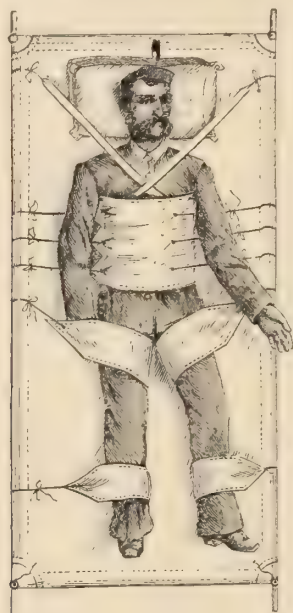


Gihon's Naval Ambulance Cot.

shipped, placed inside the canvas, and the whole rolled up compactly and placed between the beams overhead."

The apparatus consists essentially of an oblong piece of stout canvas, about seven feet long and two (or two and a half) feet wide, with the long edges (sides or leeches) and the ends doubled and sewed so as to form casings or sheaths, in order to receive, those on the side two

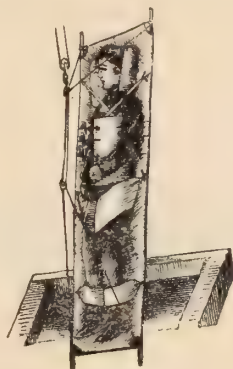
staves of tough elastic wood or bamboo, eight feet long, and through the end casings, two stretchers of the same material, two (or two and a half) feet in length. The extremities of these longitudinal staves are rounded to form handles, and are passed through metal castings on the ends of the transverse stretchers, the whole forming a springy portable bed or litter. A canvas band twelve inches wide, securely sewed to the cot bottom, is intended to envelope the chest, and is attached to the sides of the cot by cords passed through eyelets in the canvas. Two



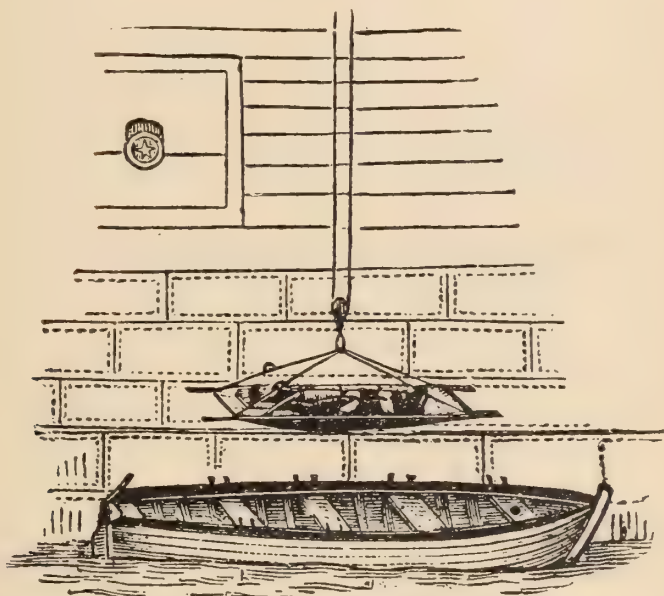
Invalid secured for transportation.

narrow straps, attached to the upper edge of this chest-band, pass, one in front of each shoulder, and being also fastened by cords to the opposite sides of the cot frame, assist in keeping the chest-band in place. Two canvas femoral-bands, seven inches wide, sewed diagonally to the cot bottom, receive and envelope each thigh, and are likewise made fast to the cot frame by terminal cords. These femoral-bands sustain the principal part of the weight of the body when the head of the cot is elevated toward the perpendicular. Two narrower bands, five inches wide, similarly sewed to the cot, and attached to

the frame on each side, receive and confine the legs. A canvas-covered hair pillow, loosely secured to the cot by cords passed through eyelet-holes, completes the apparatus. A sling with a cringle (an iron



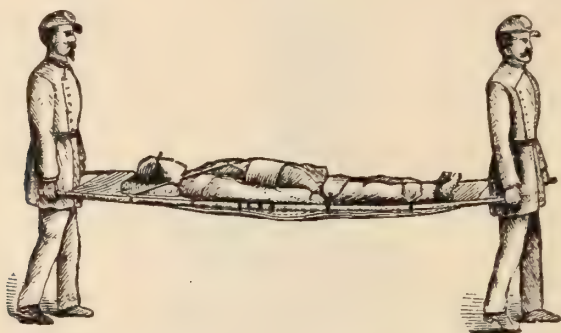
Lowering Ambulance Cot through hatchway.



Swinging Ambulance Cot over ship's side into boat.

ring or thimble) placed in the middle, and one on each part near the upper stretcher, enables the cot to be lowered endwise or to be swung

horizontally. The rounded extremities of the side staves may rest on the thwarts of a boat or on blocks in a wagon, protecting the patient's body from pressure underneath, and forming a comfortable bed during his transfer to his destination; and they may be conven-



Gihon's Ambulance Cot used as a hand litter.

iently grasped by a man at each end and the cot carried to the very bedside which is to receive him. The weight of the apparatus is less than thirty pounds, and when not in use the stretchers may be unshipped and the cot rolled upon the staves into a bundle eight inches in diameter, which may be readily stowed between the beams overhead, or in some other easily accessible place.



Gihon's Ambulance Cot rolled up for storage.

.While this cot was devised for naval and marine purposes, it is equally adapted for field service, when the use of wheeled vehicles is not practicable. Dr. Otis states that under such circumstances the ambulance equipment must be able to keep up with the troops and not interfere with their rapid movements. The lengthening of the side staves, by shaft attachments at the upper end and by drag-pieces or by low trucks at the other, enables it to be used as a horse-litter, or as a combined hand- and horse-litter, like those devised by Surgeon (Deputy Surgeon-General) Charles R. Greenleaf, United States Army, and Assistant Surgeon (Surgeon and Major) Peter J. A. Cleary, United States Army. Its lightness and compact stowage permit its ready transport, while the fixed bands and terminal cords

allow the safe fastening of the wounded or helpless sick man to the cot, and prevent his falling out, with the least possible disturbance of an injured limb, which is separately and immovably secured.

A FIELD HOSPITAL KITCHEN WAGON,

FOR STERILIZING DRESSINGS, AND COOKING FOOD, AT THE DRESSING STATIONS AND ON THE MARCH.

BY CAPTAIN H. O. PERLEY,

Medical Department, U. S. Army.

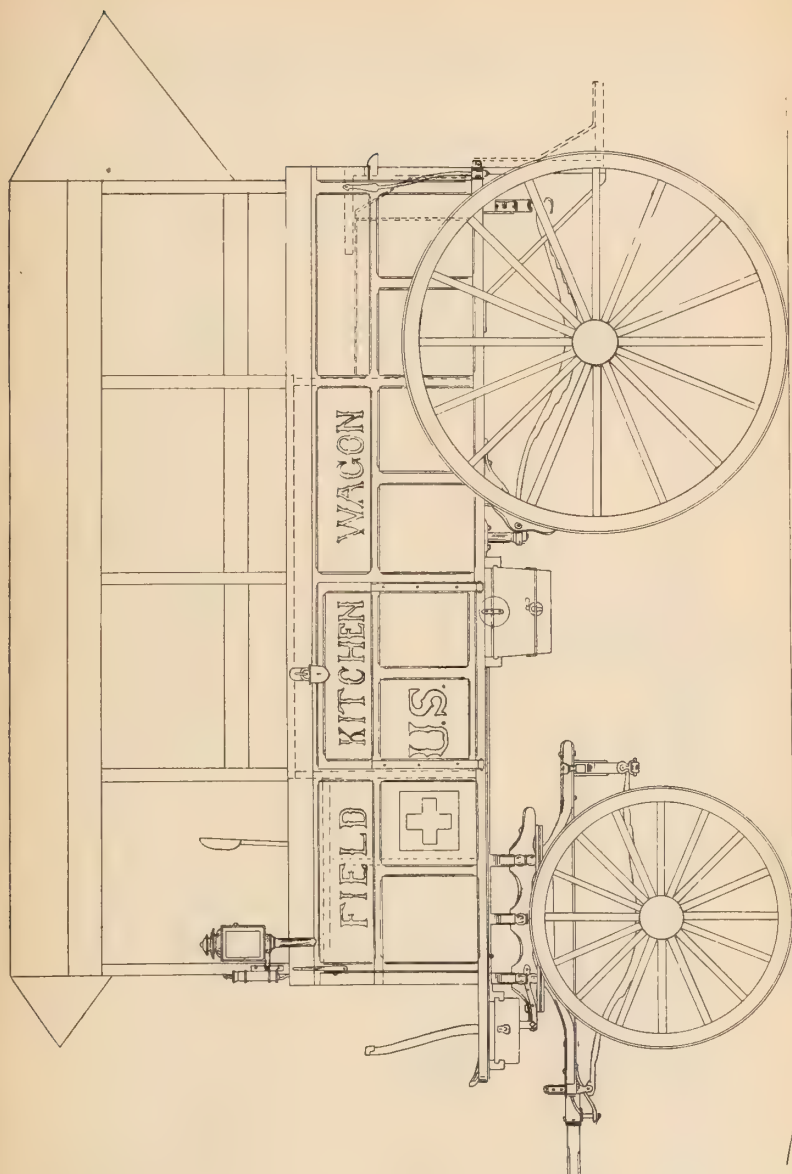
The history of a systematic and humane method of treating and transporting the wounded on the battlefield dates from our late Civil War.

The valuable lessons taught by that war have been carefully studied by Military Surgeons the world over, and as a result of this study there is hardly a civilized nation which has not a Sanitary Corps organized and equipped for the field, and an Ambulance System for Field Transportation adopted, and ready to be put into action. Our own Army is on equal footing in this respect with the best of foreign Armies. We have an organized and well-equipped Hospital Corps, large enough for our present needs and capable of being enlarged at any time. Army Regulations specifically define our Ambulance Corps, and our new pattern Ambulance, 1892, is a great improvement over any other Ambulance we have ever had. So far we are ready for war, but the question now arises, shall we remain satisfied with what has already been accomplished, and wait for time and occasion to make such changes and advancements as may be deemed necessary? To this question I would answer, emphatically, no; the present is the time to consider and discuss all ways and means of furnishing aid to the wounded soldier, leaving to the occasion and the inventive genius of the American mind to improve upon such means as have been carefully tried and approved. Other Departments of the Army are doing their utmost to make war more destructive to human life. It should be our duty to equal their efforts, by sparing no legitimate means, by which human suffering can be saved on the field of battle. Writing on a kindred subject,

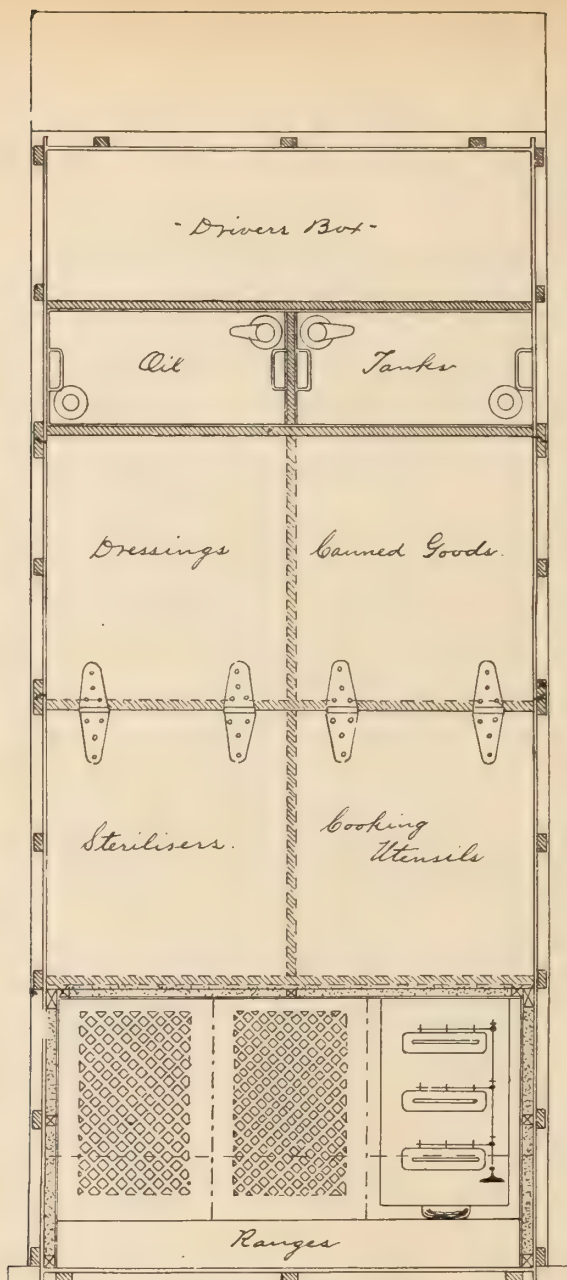
a distinguished English officer, has truly said that "the principle was laid down, and has practically been accepted by Governments, that if the soldier has the right to receive the best equipment to enable him to fight, he has equally the right to expect the best care which Surgery and Medicine can afford if he has the misfortune to be wounded on the battlefield."

Among the many unsettled problems in rendering this "best care" to the wounded, there are none, it seems to me, of greater importance than that of furnishing some practical means by which aseptic Surgery may be practiced successfully in the field, and that of furnishing to the sick and wounded nourishment without the long delays which so often happen, and are, as we all know, injurious in their effects on men worn out with fatigue and pain. It is with the hope that this wagon may suggest a way to overcome the difficulties above mentioned, that I offer this design for your consideration.

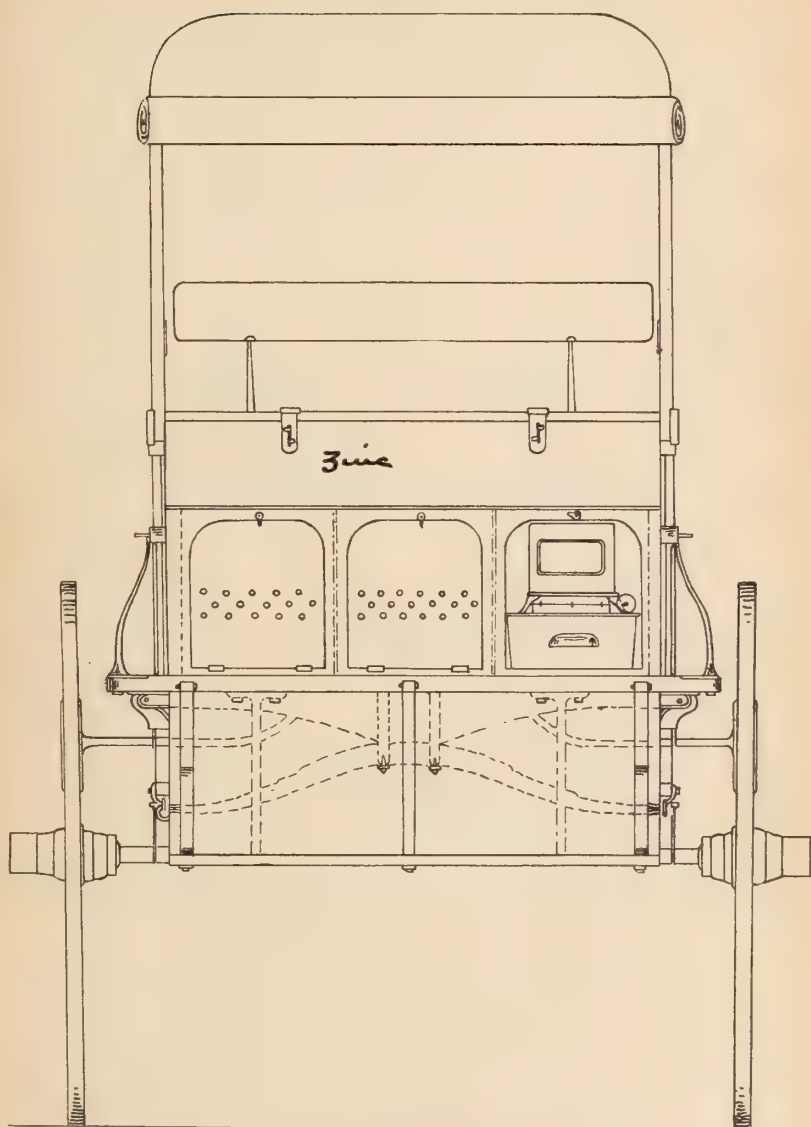
For the want of a better name I have called it a Field Hospital Kitchen Wagon. It is intended to carry a hospital tent and fly folded, tent poles (made with a jacket so that they can be readily carried on the axles without projecting behind too far), and a folding operating table. The body of the wagon is divided into compartments for oil tanks, dressings, stimulants, anæsthetics and food, large sterilizer and cooking utensils, and a cast-steel oil range with 9 large burners. With the loaded wagon, the Medical Officer in charge, can locate his Ambulance Dressing Station wherever he may think necessary. He can have his tent put up, fires lighted and by the time the wounded are brought in from the First Dressing Stations, his instruments and dressings are sterilized, the water boiling and everything ready for work. He is entirely independent of his surroundings as far as fuel or water are concerned. The tanks carry fifty gallons of oil, and the water tanks will carry twelve gallons of water. Each ambulance will carry about nine gallons of water, and his supply can be replenished from this source as often as necessary. He has in fact, under his charge, a small field hospital, and if in the ever changing scenes of a battle it becomes necessary to move, he has only to put out his fires, pack his wagon, and he can take his



Side View.



Top of Body of Wagon.



Rear View.

Ambulance Dressing Station wherever a wagon can go. Everything is compact and at hand, and he thereby makes a great saving in time. The advantage of being able to cook food whenever needed, either in the form of beef tea, soup or coffee, is apparent to any one.

DESCRIPTION OF WAGON.

As far as it was possible I have taken the Ambulance pattern, 1892, as a model. All the parts are interchangeable. The running gear is the same. This offers a great advantage, for the running gear is always the part that breaks first, and should a wheel give way or a tongue break it could readily be replaced by a similar part from an Ambulance.

The body of the wagon is nine feet, three inches long; four feet, two inches high. The length of the body, back of the driver's seat to the tail gate, is seven feet, eight inches. This space is divided in the center by a one-inch oak partition for a distance of five feet, and partitions, placed at right angles to this divide the wagon into the following compartments:

First two compartments two feet long by two feet high by one foot wide. Each to contain an oil tank, of heavy galvanized iron, fitted with a pump, a countersunk hollow and screw cap, and strong handles. Each tank to carry 25 gallons of oil. The second compartments are two feet long, two feet wide and two feet high, each. One to be fitted with shelves for anæsthetics, stimulants and condensed food and coffee, and the other for dressings. These compartments open on the outside with lug hinges, the door forming a shelf. The top is made watertight by using oak strips two inches wide, tongue and groove, and laid in white lead. The third compartments are two feet long, two feet high and two feet wide and are designed to carry, the one, a large sterilizer, basins and antiseptic trays. The other, the necessary cooking utensils. The remaining space of the body of the wagon is partitioned off with a one-inch oak partition, and upon this partition, and the two sides of the body, is nailed a one-half inch layer of mineral wool; over the whole space, including the bottom of the wagon, is securely nailed a layer of zinc. These precautions make this part of the wagon safe, as far as the danger from

fire is concerned. The oil range consists of a rectangular box, two feet long, by one foot six inches high and twenty inches wide. The top, front and frame are made of Bessemer cast-steel one-sixteenth of an inch thick; the sides and back are enclosed by sheet iron. The range is secured by bolts to the back partition, sides and bottom of the wagon, and is held so firmly, that if the wagon were turned over, the range would remain in place. By means of sheet iron partitions the range is divided into three sections. Each section has an oil stove, with oil well of sixteen ounces, planished copper, fitted with three large burners. The oil wells are secured by sliding in grooves, being held in place by thumbscrews. They will carry three gallons each, and allowing three ounces of oil, per hour, for each burner (the Government allowance is two ounces per hour for a two-inch wick, for lighting purposes), they would burn for 42 hours without refilling. The doors and general construction of the range are similar to the light French steel ranges now so common in our markets. The water tanks are one-third larger than those belonging to the ambulance, but in every other respect they are the same. A step made of oak covered with a light corrugated iron plate, is securely fastened, at a right angle, to the top of the tail gate. This step is fourteen inches wide, by four feet long, and when the tail gate is down it forms a platform for the cook to stand upon. When the tail gate is closed it passes over the top of the stove and protects it from injury.

The heaviest part of the load has been placed over the front and rear axles. The oil will weigh about 325 pounds, and the oil range about 75 pounds. The wagon could readily be drawn by two horses over an ordinary road.

I have selected oil as a fuel, because it is produced in abundance in our own country; it is not expensive, and no delay is caused in using it.

Military Medicine, Surgery and Hygiene.

NOTES ON THE INTRODUCTION OF TENT FIELD HOSPITALS IN WAR.

BY COL. B. J. D. IRWIN, M. D.,

Assistant Surgeon General U. S. Army.

When at war man is seen in his normal state. By civilization his warlike instincts have been restrained; but his aggressive propensities have not been eradicated—merely curbed and held in abeyance through barriers established by social laws. The tendency to exercise his physical strength is manifest in proneness to thrust aside the trammels that restrain his propensity to indulge natural impulse. As a warrior he has been depicted at his best and in the most glaring colors.

It was not until after the sensation of triumph had subsided that Pity was conceived, and only when the weak appealed to man's strength was Mercy born. After those Charity followed, bringing aid for the sick and protection to the helpless. Through the benign influence of those harbingers of Peace, man's savage nature was brought under social control.

In the earliest authentic history of warfare, we learn from the father of Grecian poetry that measures were taken to assist the wounded, and are informed that the surgeons who formed part of the army of Agamemnon combined the duties of warriors with those of the sanitarian, and that they rendered professional aid to those disabled amongst their fellow-combatants. Cyrus and Alexander provided measures for the care and relief of their invalid warriors. In his writings Caesar has left descriptions of the means taken in behalf of the "valitudenarians" of the Roman armies. Of the special nature of the hospitals and professional service of those days we possess no details. During these semi-barbarous ages human life was valued at a low figure. The fate of the wounded soldier was sad in the extreme. In the dark ages his condition was not improved.

Even in the middle ages little attention was bestowed upon the vast majority of the unfortunates who were disabled in war. While the sick nobles and leaders were succored and cared for by friends, the inferior grades of combatants usually had to depend on chance or the interposition of Divine Providence.

In the sixth century of our era the first attempt appears to have been made to organize a system of relief for the wounded on the field of battle, Mauritius having had his armies provided with persons charged with removing from the field those wounded during the battle.

The wars of the Crusaders, with their chivalrous devotion to the weak and infirm, resulted in the organization of a special order of Knighthood—Hospitalers or Knights of Saint John—part of whose duties was devotion to the sick and wounded. To stimulate the religious zeal of the pilgrim-warriors in their holy wars, bishops and clergymen were abundantly provided, but necessary medical and sanitary measures were either neglected or were utterly inadequate to meet even a tithe of the interests involved. Surgeons, so-called, there were, but, as in the days of Trojan warfare, their first duty was to combat the enemy, after which—when not disabled in the fray—they were expected to give some rude measure of assistance to their injured companions.

To Rome belongs the credit of having had one of the earliest hospitals if not the first, established by Fabiola, in the sixth century. Toward the termination of the eleventh century the Emperor Alexius organized permanent hospitals at Constantinople, but the institutions were simply asylums for the collection of invalids, to be fed by the charitable and comforted by the prayers of the faithful.

Under the auspices of that famous surgeon, Ambrose Pare—to whom the profession is indebted for more than one of its greatest progressive strides—field hospitals were first established in France toward the close of the sixteenth century by the illustrious Henry of Navarre. To Pare's influence with Henry Quatre civilization doubtless owes the erection of the magnificent temple—Hotel des Invalides—dedicated to humanity through the munificence of Louis the Fourteenth. The beneficent example offered by that famous insti-

tution was promptly recognized by the establishment of Chelsea Hospital in England, under James the Second, who probably derived his inspirations on this subject through his sojourn at the court of the French monarch.

With the advent of gunpowder in the art of war came also a new era in surgery. Up to the period when the use of firearms introduced a potent factor in changing the nature of the wounds inflicted in personal combat, military surgery had made but little if any progress beyond the crude and ignorant methods of relief followed by the ancients; and hence it was not surprising that the treatment was in keeping with the tardy changes made in the mode of inflicting injury in battle, when muscular strength and personal prowess were mainly relied upon to disable or vanquish an antagonist. Thereafter the days of amulets and shrine cures, of talismans and incantations, of cabbage leaves and loathsome nostrums, as remedial measures, were at an end. The credulity of those suffering from shattered bones or lacerated flesh would no longer be cajoled by imposture; so that the infliction of gunshot wounds heralded improvements that soon developed a rational and scientific system for the management and treatment of military invalids, which, while keeping pace with the progress made in the art of war has, by developing our present enlightened mode of treating the sick and wounded, done much to diminish its dreadful effects upon man. "The great mechanical and material inventions which have multiplied the means of destructive warfare have happily been met by corresponding improvements in the media designed to counteract their evil effects upon human life."

AMERICAN EXPERIENCE IN WAR—WARS IN THE EIGHTEENTH CENTURY.

The war between Great Britain and part of the colonial settlements in North America, after a conflict covering the period from 1775 to 1782, resulted in those colonies being recognized as an independent nation—the United States of America. A second war against the same power commenced in 1812 and was brought to a successful close in 1815. A war against the Republic of Mexico, 1846-1848,

was the third and last instance in which the United States engaged in a foreign war. The naval forces of the country have been used in two or three instances to inflict chastisement upon the inhabitants of semi-barbarous regions, but such acts did not amount to warfare, on an extensive scale.

Excepting the periods embraced during the existence of those wars, the army of the United States was maintained on a peace footing. Its members however were engaged in almost perpetual conflict with savage adversaries, ever on the alert to carry desolation and death to the venturesome pioneers who, in their migrations, never hesitated to dispossess the autochthonous inhabitants of their natural inheritance. By thus affording protection to the progressive pioneers engaged in wrestling from savage control the vast and fertile regions which have subsequently been developed into powerful States and rich communities, the American army became the shield of the frontier settlers and the picket guard of American civilization. The nature of the conflict waged from year to year between the federal army and its savage opponents although fruitful in the development of personal courage of the most exalted nature, fortitude and patience under extraordinary privations, had little if any tendency to disclose those scientific improvements which in later times have become powerful factors of destruction or useful aids in mitigating some of the horrors of war, even when the nations recognized among the most civilized became the combatants.

When in 1812 the United States declared war against Great Britain, but little if any change or improvement in the management of army invalids had taken place. As in the preceding century, hospitals for the sick or wounded soldiers were almost universally established in villages, towns or cities contiguous to the field of active operations. This was the immemorial custom followed in the European wars, as the thickly populated countries through which transatlantic armies campaigned afforded shelter in private and public buildings, farm houses, barns, churches, barracks, and even in huts and hovels near the camps and battlefields. Ambulances being then unknown, wagons, carts and hand-barrows were pressed into

service to bear the wounded from the field of battle to the foul and dreary resting places miscalled hospitals. Comforts, such as hair mattresses, sheets, pillows, etc., were unknown to the sufferers of the wars of Turenne, Marlborough, Wellington, Napoleon, and even those of later date. Straw, hay, or even an earthen floor to repose upon were deemed comforts of no ordinary character for the accommodation of the sick or wounded soldiers of those times. It is assumed that the possibility of securing farm houses and barns, replenished with hay or straw, has been a potent cause of the predilection shown for such structures when improvising military hospital accommodation to meet pressing emergencies.

Steam not having been utilized as a motive power until a comparatively short time ago, hospital boats or railway carriages for the transportation of invalids remained to be solved in our own day. In 1814 general hospitals were in operation at Platsburg, Greenbush, Malone, Buffalo, and at Watertown, in the village academy of the latter place. At Lewistown, another was established in two barns, with a number of tents as addenda. The wretched character of these makeshift establishments can be inferred from the following description: "In September the sick in hospital at Platsburg, numbering 720, were, in view of the approaching fight, transferred to Crab Island. No accommodation had been provided for them on the island, and they remained for three days exposed to the wet and cold, when Dr. Powell determined to transport them to Burlington, which he did in open bateaux across the lake. This crowded the hospital at Burlington to such an extent that the ill effects of crowd poisoning were soon perceived in the increased number of deaths and the slow convalescence of the many. Typhus, dysentery and diarrhoea became prevalent." (History Medical Department of the Army—War of 1812-15, p. 92 et seq.)

Thus it may be seen that the war of 1812-15, following as it did immediately after the great European conflicts between Napoleon and various nations, failed to devise new or develop improvement in hospital construction, or a practicable system for the care and treatment of military invalids. The famous military surgeons of that era,

Larrey, Valpeau, Roux, Hennen, Ballingall, Guthrie, and others, appear to have been content with doing as their predecessors had done, and they acted as though they believed that the best that could be done for the accommodation and relief of the wounded soldier consisted in having him, as soon as possible, carted off to the rear of the army, to take his chances between recovery and death in some crowded and ill-provided building, or at best in some town or village infirmary. The general or base hospitals were on a par with the character of the field service, and the necessary food, furniture and appliances provided, and when compared with those of modern times, were little better than death-traps to those compelled to enter their noisome precincts in quest of relief from suffering.

EXPERIENCE IN THE AMERICO-MEXICAN WAR.

After the termination of the Napoleonic conflicts and those between the United States and Great Britain in 1813-15, the civilized people of Europe and North America remained at peace with each other until 1846, a period of some thirty years, when war commenced between Mexico and the United States. It continued two years, during which the hospital organization for active service was regimental, with base or general hospital for the care of such sick as could not be taken care of with their regiments when the army advanced into the enemy's territory.

After the battles of Palo Alto and Resaca de la Palma, the sick and wounded were sent to Point Isabel, where they were temporarily provided for in hospital tents and by clearing out quartermasters' storehouses. At New Orleans, Baton Rouge and Corpus Christi, barracks and adjacent buildings were fitted up as general hospitals for the accommodation of sick and wounded from the field of operation in Mexico. Those wounded at the battle of Buena Vista were sent for treatment to general hospitals at Saltillo—some twenty miles from the scene of conflict—the slightly injured being treated in the regimental hospitals. During the siege of Vera Cruz, the sick and wounded of the beleaguering army were treated in the regimental

hospitals, but, on the capture of the city, a general hospital was established in a building formerly used as a monastery.

Pending the operations before the City of Mexico hospitals were established at Tucabaya and Mexcoac. After the fall of the city they were discontinued and others established in various buildings within the capital, where the sick and wounded of the army were treated.

In the treatment of the wounded during that war the recognized custom of sending the invalids to the base hospitals as soon as possible after the reception of the injuries was adhered to, even under the disadvantage of transporting them over many hundred miles of rough roads leading from the mountainous interior to the seacoast, after which they were shipped to general hospitals distant from two thousand to three thousand miles from the fields of active warfare!

EXPERIENCE OF THE CRIMEAN WAR.

The next great conflict of arms, known as the Crimean War, was carried on during the years 1854-56, between France, England, Turkey and Sardinia on the one side, and Russia on the other.

In the armies of each of those powers the system followed in providing hospital accommodation for the sick and the wounded exhibits slight change from the long-established customs, and, judged by the notoriously unsatisfactory and sad results, indicates that but little improvement on the important subject involved in the proper management of army invalids had been made during the long interim of peace embraced between the close of the campaigns against the great Napoleon and the advent of that war.

The old and traditionary habit of securing hospital accommodation by seizing upon any and every variety of contiguous building was still followed, and to make amends for their absence, when they could not be found within reach, ill-constructed huts, utterly unsuited for the proper accommodation of the invalids of an army engaged in active warfare, were erected, as the most desirable substitute for the old and favorite resource of former campaigns.

Some idea of the forlorn condition of the invalids of the English portion of the forces engaged in the memorable Siege of Sebastopol

may be formed from the following graphic description written by one of the prominent British medical officers, describing the sufferings and privations experienced by the brave and patient men engaged in the laborious struggles involved in the reduction of that famous stronghold:

“ From all that has been said on the housing, clothing, food and fuel provided for the soldiers, and the killing toil exacted from them during the period of the war which had most influence on their health and after history, the sad picture may be formed of their position in the Crimea. Day after day passed in severe bodily exertion and anxious watching—one moment digging laboriously in extending approaches, and the next with arms in hand repelling the assaulting enemy; almost always wet, exposed without cover to the drenching rain and soaking snow, the keen frost and biting winds; standing for days in wet mud, constantly either unnaturally excited or depressed; their dirty, besmeared clothes in rags, their bodies covered with loathsome vermin, which seemed to grow out of their very flesh; no comforts in their wind-pierced tents on the bleak plateau; no fires, unless weary and foot-sore as they were, they dug beneath the snow-covered sod for wet roots wherewith to kindle a feeble tantalizing blaze; without food till after hours of persevering exertion, they managed to half cook their impalatable ration over their winking fires; huddled into a crowded tent to pass the night in close, noisome atmosphere, on the oozy ground, covered by the same blanket which protected them in the wet and muddy trenches; longing for the morning, though its early dawn was signaled by bugle sound which called them to a renewal of that dread task which made them yet again sigh, ‘Would to God it were night.’ This is no exaggeration. Can we, then, find anywhere else in reality—nay, may we, by the utmost stretch of imagination conceive a more frightful field for the seeds of disease, or the harvest of death, than is here presented to us in camp of the weary, anxious, unaided soldiers who fought so gallantly, endured so constantly or died so nobly, and who now consecrate, by their humble graves, the green hillsides and lovely valleys of the Crimea?

"The bare remembrance of that frightful combination of circumstances which seemed to encircle our army, as with ever-contracting walls of iron, and made prisoners for the dread scourges, cholera, fever and dysentery, that, like the angel of Sennacherib, destroyed our noble and gallant army, comes to one's memory like the awful vision of a distempered dream. These must be recalled, as they had a most important influence on the annals of war, and much that would otherwise be unintelligible becomes clear as noon-day when read by the light thrown on it by these circumstances.

"But if such a condition of things as I have fully outlined was trying to the strong, how can I express its influence on the weak! It is impossible fully to realize the hopeless condition of the sufferers, struck down by enfeebling sickness or exhausting wounds, and deprived of the vigor which alone made hardships endurable.

"The regimental hospital marquee and the round bell tent which served as hospitals were of necessity vastly overcrowded. The former, which ought to have contained twelve to fifteen men was made, from the exigency of the service, to cover three times that number. The unsuitableness of the bell tent to hospital purposes has been fully expressed by commissioners when they said: 'Whatever may be the supposed advantages which have led to its adoption as a barrack tent, it would be difficult to contrive anything much more unfit for the accommodation of the sick.' There were no bedsteads, and those patients who had empty sacks to lie upon were considered fortunate. Few blankets belonged to the hospitals and the food provided was but ill adapted for invalids; nay, in many instances, constituted a veritable poison; medicines, even the most necessary, were but scantily provided; attendance by overworked, and in many cases sick doctors, and by a handful of orderlies, themselves for the most part convalescents, soured and crabbed by the hardships and fatigue to which they were exposed—such was the condition of the sick during the first winter. If to sickness were added wounds—a broken limb or contused body—how small was the chance of recovery? The man lost hope. Every circumstance forbade recovery. The powers of evil seemed to grasp his destiny. The problem of life

was being solved by every conceivable antagonism having a voice in the momentous decision. Such being the circumstances given, how could any other result follow than a mortality which caused our land to ring with the voice of mourning, and which for a moment paralyzed our senate and our people? The wildness of despair is the only excuse which can be made for the blame of so much misery having been cast on the medical department, which had no control whatever over the events that led to it, and the voluntary sacrifice of whose members, though glorious to themselves, were unable to retrieve the deplorable errors committed by others.

“The general hospital to which men struck down in the trenches were first carried, consisted at first of twenty and latterly of thirty Portsmouth huts. These huts were originally erected for the barrack accommodation of the 14th and 39th regiments, and were not used for hospital purposes till late in the spring of the latter year. Each hut measured twenty-seven feet by fifteen inside, and contained during the siege fourteen beds. The air contained in those huts allowed about 260 cubic feet to each of fourteen patients. Being constructed of single boards, and roofed with felt, they were not impervious either to wet or cold. In wet weather water decks had to be constructed of water-proof sheeting.”

With such defective hospital provisions it is not surprising to learn that disappointment and disaster followed and that the relatives and friends of the gallant men who, at the sacrifice of health and at the peril of their lives were struggling against such adverse circumstances to maintain the honor of their country, should have been grieved and shocked beyond measure. Even at this remote date it is truly amazing to realize that during the two years of extensive warfare waged between nations endowed with the highest order of intellectual development and possessed of vast wealth—including the appliances of modern civilization—the most advanced kind of hospital provided for field service by one of the most enlightened peoples involved progressed no farther than the single step of substituting flimsily-constructed huts for the absent cabins or analogous structures, improperly depended upon at that time to afford shelter to soldiers disabled in campaign. Men severely wounded or prostrated by dan-

gerous disease were hurried from the field, packed into crowded transport-ships and conveyed to the improvised hospital dens established at or in the neighborhood of Constantinople, where death ran riot amongst the inmates. With such disastrous results, no wonder that the friends of those unfortunate men were shocked at the fearful mortality that swept so many of them into untimely graves. Had they been allowed rest and afforded suitable shelter near the site of their gallant deeds, how many precious lives that were sacrificed to the pernicious custom of hurrying off the wounded and the sick to the base hospitals might have been saved, can only be surmised at this date.

While the allied armies were encamped at Varna, cholera having become epidemic among the troops, the French medical officers were obliged to treat a large number of their sick under canvas with the most encouraging and satisfactory results, demonstrating the vast advantages of treatment in tent hospitals over those obtained in improvised hospitals in buildings. But unfortunately the lesson seems to have ended there, as it was not followed up in the Crimea, by extending to the wounded the benefits of the suggestive experience gained but a short time previously in Bulgaria. I can not do better than read a striking illustration of the value of that experience in the words of one of the few recognized authorities who has written on this important sanitary subject:

“Mr. Levy was not led by theory to resort to the employment of tents—it was dire necessity—the mother of invention inspired it and provoked the progress. * * * Without recounting the terrible ravages of the cholera in the Piraeus in the confined buildings, such as the eastern lazaretto, and at Gallipolis, in the enclosed dilapidated Turkish houses which affected the hospital service, we found at Varna the elements combined to afford a decisive comparison. The two interior hospitals had received from July 10 to September 18, 1854, 2314 cholera cases, of whom 1389 succumbed to the disease; that is to say 166 of those patients gave one hundred deaths! In the three hospitals under tents 2635 cholera cases were received of whom 698 died, equal to one hundred deaths in 376 patients, an extraordinary favorable proportion. * * * Another benefit: The enclosed

hospital at Varna retained for a long time, in spite of all efforts, a certain power of infection; with the tents no infection; no fears for such; not a medical officer succumbed while seventeen paid with their lives their devotion to the cholera patients treated in the confined hospital buildings of Gallipolis, Adrianople and Varna. The separation of the sick in tents into groups of from three to eight is a veritable scattering; between the tents the ample amounts of free atmosphere outside; the hospital building circumscribed, condensed, gather the morbidic germs, whatever they may be; the tent hospital separates, disperses, dissipates them. The chances of infection and contagion are greatly lessened in the tent, while they are at their maximum in the hospital building."

Could there be anything more convincing than such satisfactory experience? Yet, within a few short weeks thereafter, the lesson was disregarded and ignored and, as the consequence, much unnecessary suffering and loss of life were the sad results. Surely this could not have resulted from indisposition to countenance an innovation, since recognized and so practically demonstrated as the best and most reliable system that can be devised to meet the wants of the sick and the wounded of an army engaged in active service.

LESSONS OF THE WAR OF THE AMERICAN REBELLION.

In April, 1861, war between the national government of the United States of America and the soi-disant Confederate States commenced and, after a series of brilliant campaigns and many sanguinary battles, was brought to a successful termination by the complete restoration of Federal authority throughout the revolted States in the corresponding month of 1865. For the first time in the history of war a well-equipped, disciplined army of upwards of a million soldiers was seen marshalled by a single power in defence of national integrity. War was levied and conducted on a scale commensurate with the nature of the interests at stake and the resources of the powerful and enthusiastic communities involved in the gigantic conflict. In order to understand what progress or improvement in the care of military invalids in the field had been made during the interim embraced between the close of the war with Mexico and the commence-

ment of the War of the Rebellion, the language of Surgeon Charles H. Tripler, U. S. A., the first Medical Director of the Army of the Potomac, is submitted in the terse and graphic words of one of the most observant and devoted officers of the branch of service of which he was an illustrious member:

He wrote, "I joined the Army of the Potomac August 12th, 1861, and was immediately charged with the organization of the medical department. * * * The army was encamped on the south side of the Potomac, covering an extent of some miles, from Arlington Heights to Alexandria, several miles down the river, and in and about Washington. There were some five or six hotels, seminaries and infirmaries in Washington and Georgetown occupied as general hospitals under capable officers, but with no system in reference to admission or discharge of patients. Every regimental surgeon sent what men he pleased to the general hospitals, without knowing whether there was any room for them or not, and men were discharged from the hospitals with no means provided to insure their return to their regiments. It was not an unusual circumstance for sick men to pass the night in the ambulance, wandering about the streets from hospital to hospital seeking admission. I could find no information anywhere as to what regiments were present or whether they had medical officers or not. * * * The regulations of the Army recognized only regimental and general hospitals. The regimental hospitals in the field were established in tents or in such buildings as might chance to be within the limits or in the immediate vicinity of each camp. The general hospitals available for the Army of the Potomac were the few old hotels or similar buildings occupied as hospitals in Washington, Alexandria and Annapolis. There was no authority for any hospital establishment in the vicinity of the division or brigade that might relieve the regimental hospital tent. * * * The buildings already provided and occupied were seen at once to be totally inadequate. The entire hospital establishment in the above named cities contained only 2700 beds."

Such were the first meager attempts to provide hospital accommodation for the invalids of an army numbering 140,000 to 180,000

men preparing for active service in the field! In further illustration of the disappointment caused in the public mind and the confusion resulting from the absence of an adequate system of hospital organization to meet the demands of the vast numbers of military invalids suddenly thrown upon the hands of the medical service, the words of Dr. Tripler will convey some faint index of the annoyance and unlooked-for interference that handicapped the medical department in the discharge of its onerous duties:

"I may mention here that a great deal of presumptive intermeddling with the medical department of the army occurred from time to time. Sensational preachers, village doctors, and strong-minded women, suddenly smitten with a more intricate knowledge and thorough perception of the duties and administration of the medical department of an army than I had been able to acquire in more than thirty years' experience and study, obtruded their crude suggestions, and marring where they could not make, and paralyzing where they attempted to quicken, succeeded by their uninformed zeal, innocently enough, perhaps, but not the less unfortunately on that account, in defeating measures I had much at heart, had carefully contemplated, and intended to carry into effect at the proper time.'

Manifestly the provisions made for the accommodation of the invalids of the troops concentrated around Washington, preparatory to taking the field, were of the old-fashioned character and as crude as they appear to have been unsatisfactory and inadequate to meet the necessities of a large army on active service. The hospital service in the armies operating in the Western and Southwestern States was first formulated in accordance with the system followed in the Eastern armies, but when tested proved even more objectionable and unreliable. The sparsely settled nature of the country through which the Western armies campaigned, and the vast distances traversed between one objective point and another, demonstrated that very little or no reliance could be placed upon the makeshift custom of finding buildings for hospital purposes along the routes taken by the marching columns. In thickly populated countries, where towns and villages are not far apart, armies have heretofore relied upon the

probability of finding structures of one kind or another contiguous to the sphere of military operations, wherein at least temporary shelter could be secured for those rendered hors de combat by casualty or disease. But when our armies entered on campaigns in the southwestern regions of the soi-disant Confederate States, they moved away from railways and navigable streams, and were thus early taught the necessity of relying upon their own resources to provide shelter for their disabled comrades. That experience soon suggested modification of the old makeshift manner of providing field hospitals and resulted in a system that has revolutionized the manner of providing for the care of sick and wounded soldiers by rendering armies in campaign independent of fortuitous circumstances for the management of those of their numbers who become helpless through incidents of active service. In exchange for the huts and hovels, until then looked upon as the natural retreat for the invalids of an army in the field, the tent offered a convenient, portable and reliable substitute. As to when and by whom it was first used, that is a matter involved in the realms of doubt and uncertainty, but we know that the tent has been in use as one of the earliest forms of human habitation, and that it has undergone various modifications and changes in form and material can be conjectured when its modern mutations and present variety of form are compared with those indicated by historical allusions to Pelides' lofty tent:

**"Of fir the roof was raised, and covered o'er
With reeds collected from the marshy shore."**

* * * * * *

**"With solemn pace through various rooms he went,
And found Achilles in his inner tent."**

* * * * * *

The forerunner of permanent dwellings was the tent of one form or another, and since the dawn of civilization to the present time it has afforded comfortable and portable dwellings to nomadic or pastoral people, especially to those of Central Asia, Arabia, Northern Africa and the aboriginal inhabitants of the great plains of North America.

At first the hospital service in the armies operating in the South-western States were formulated after the old-fashioned defective system followed, and when tested proved unsuitable until experience caused modifications and improvements necessary to meet the demands made upon it.

The first great battle of the war was fought April 6th and 7th, 1862, at Shiloh, Tennessee, and resulted in many thousand casualties. The Medical Director of General Buell's army, Surgeon Robert Murray, subsequently Surgeon General, U. S. A., writing of the result of the two days' sanguinary conflict, describes in graphic language the crude provisions made for the professional treatment of the sick and wounded after the battle:

"I arrived at Pittsburg Landing at 10 o'clock a. m., 7th, and found the main depot for the wounded established at a small log house near the river, about half a mile from the line of battle, at the commencement of Monday morning's engagement, and a little over a mile from our line at that time. * * * Many of the wounded had been put on board the commissary and quartermaster's store-ships.

"Hospital boats and other steamboats were filled with sick and wounded and not a few skulkers were carried off to Northern cities. The whole affair was unsatisfactory to me. Our army—Buell's—was hurried up to take part in a terrible battle, leaving all the tents, bedding, ambulances and medical supplies behind. I arrived when the second day's fight was half over, and found some five or six thousand wounded to be provided for, with, literally, no accommodation or comfort, not even the necessities of life; no bedding, no cooking utensils or table furniture, not even fresh beef for the first day. It was raining incessantly and the mud was very deep; it was impossible to obtain tents enough to shelter the wounded, or straw for them to lie upon. The battle was raging a mile and a half in front, and, for two days after the fight, all the effective and well-organized soldiers were held in readiness for another conflict. The only details of men provided to act as police for the hospital depots, and as nurses, cooks and attendants, were from the panic stricken mob who had sought safety on the banks of the river. * * *

Much of the time of the insufficient number of medical officers we had was occupied in procuring food and attendants for the wounded, and even in pressing in details of men to bury the dead, who were left for days unburied about the hospital depots. Many of the wounded were not even dressed before they were sent off. By sad experience of the battle I am confirmed in the opinion of the absolute necessity of the addition to the medical department of a corps of medical purveyors, who, in addition to furnishing medical supplies, shall act as quartermasters and commissaries to the medical department in furnishing quarters, transportation, furniture, provisions, etc., for the sick and wounded. And, also, that there should be a large number of enlisted hospital attendants attached to the medical department. They should have no other duty but to nurse and attend to the sick, should have a distinct uniform, and be thoroughly instructed in their duties."

From the above it will be perceived that to Surgeon General Murray, U. S. A., belongs the credit of being the first to perceive and officially point out the urgent necessity that called for the organization of a distinct and permanent hospital service for the proper care of military invalids. The value of his suggestions were fully appreciated, and soon thereafter men and officers were detailed to constitute a provisional Ambulance Corps, charged with the sole duty of caring for the wounded and the sick of the armies in the field.

During the latter years of the war the advantages of a properly organized ambulance service were so satisfactorily demonstrated that legislative measures were enacted for its permanent organization as a distinct branch of the military establishment of the United States, and foreign countries followed our example by promptly availing themselves of the benefits of our experience. In subsequent European wars the system was further improved, and finally adopted as an essential integral organization of all properly equipped armies. Although first established in America, its adoption as a separate organization of the Regular Army of the United States was for particular reasons deferred until quite a recent date.

In the discharge of my duties as Medical Inspector of the 4th Division of the Army of the Ohio during the battle of Shiloh, it be-

came necessary to have one of the operating stations moved forward to a deserted farm house, situated on an open piece of level, unbroken ground. The presence of a spring of cool, potable water and the nearness of the building to a small branch of a creek were advantages that were promptly recognized, and but a short time had elapsed ere these valuable desiderata were utilized in affording shelter and other comforts for the large number of wounded of our own division and those of the contending forces who had been disabled on that part of the battlefield during the conflict of the preceding day and left without assistance some twenty-four to thirty-six hours. The proximity of the operating station to the recaptured camp of a division of our troops who had been driven therefrom and partly captured by the enemy during the preceding day, suggested the utilization of the abandoned tents for the use of the wounded. As soon as the battle ceased the regimental hospital tents, commissary tents, and the wall-tents were accordingly taken possession of, and within a short space of time were removed to and pitched in regular camp order on the level ground by which the house was surrounded. The building afforded an operating room, dispensary, office, kitchen, dining-room for the officers attached to the establishment. Long into the night the ambulances continued to bring in the wounded who, after receiving the necessary professional attendance, were made as comfortable as possible, by being supplied with an abundance of warm food, good bedding and shelter against the inclement weather. Next day the camp was enlarged and systematically arranged and the tents increased so as to conveniently accommodate some three hundred patients. All bedsteads, cots, bedding, cooking and necessary utensils, hay and straw found in the recaptured camp were appropriated for the use of the hospital, and on the evening of the 8th the Division Medical Purveyor reached us, bringing our medical supplies and hospital stores. By that time the hospital had already assumed the proportion and discipline of a well-regulated regimental camp, arranged with a view to meet the special wants of those for whom it had been established. Some mattresses had been secured, and the bed-sacks, filled with hay or straw, were placed on cots or improvised bunks, so that every patient was provided with comfortable sleeping

accommodations. A suitable number of attendants of each class were detailed for duty in the establishment, which was placed under the charge of a competent executive medical officer, aided by the necessary number of professional assistants, so that the invalids were promptly and regularly supplied with abundance of properly prepared, nutritious food, and even a fair supply of extra diet, and delicacies were served to the inmates who needed special attention. It soon became manifest that the wounded who were accommodated in that improvised field hospital were better provided for and more comfortable in every particular than those who were hurried aboard the crowded transports.

Commenting upon the arrangements made for their succor, Medical Director Murray wrote: * * * "Assistant Surgeon Irwin deserves great credit for his admirable management on the field as well as for his promptness and professional skill in the care of the wounded. He found a house on the left of the field where his division was engaged, and by securing tents from the neighboring camps, and collecting camp furniture, he succeeded in organizing and putting in good working order a hospital for three hundred patients, partly of the wounded of his own command, partly of those of General Grant's army, who were wounded in that part of the field on Sunday, and partly of Confederate wounded. These were so well taken care of in every way that I designated them as the last to send on board of the boats."

In the advance of the army on Corinth soon afterwards advantage of this valuable experience was taken. Surgeon Charles McDougal, Medical Director of the Army of the Tennessee, writing relative to the operations of the combined armies of Generals Grant, Buell and Pope, subsequent to the battle of Shiloh, and the manner of disposing of the invalids of their armies, estimated that nearly eleven thousand had been sent away, but recommended the establishment of hospitals in the rear of the several armies, which was approved and carried into effect by using large numbers of tents pitched in suitable order as division field hospitals. Many deaths having resulted from typhoid fever, after the advance of the army from the banks of the Tennessee, orders were given that no fever

patients should be moved until convalescent, thus recognizing and taking advantage of the benefits by the tent hospitals established for the accommodation of the sick and the wounded of the armies concentrated for the reduction of the strong works erected by the Confederate forces for the defence of Corinth, Mississippi.

During the campaign of the Army of the Potomac on the Virginia Peninsula, there is no record of suitable hospitals having been established for the vast number of sick and injured pertaining to that army. Hospital boats and transports were kept on the adjacent waters for the purpose of conveying the invalids to the towns and cities in rear of the army.

The advantages of tents as field hospitals over barns, dwellings, and similar buildings were recognized soon after the battle of Shiloh. Surgeon General W. A. Hammond, U. S. A., in his *Military Hygiene*, edition of 1864, wrote that: "The best field hospitals, both for summer and winter, are tents. After the battle of Antietam, September, 1862, a field hospital was established near the battlefield which may be conceded a model hospital for such establishments. It was kept in operation during the entire winter, and had at one time over one thousand wounded men in it." Dr. Hammond emphasizes the great advantages of field hospitals over those located in permanent buildings in towns, and adds that "nothing is better for the sick and wounded, winter and summer, than a tent."

In contrast with this satisfactory experience is the sad condition of a so-called field hospital at Lewiston, during the war with Great Britain, in 1812-15, which consisted of two barns, each forty feet square, in each of which were placed one hundred men, but, as they were too much crowded, some tents were furnished and more room was given by removing a part of the patients, so that sixty patients were comfortably accommodated in each barn. Doctor Mann, the medical officer in charge, remarks that: "They were the most comfortable summer hospitals which he saw during the campaign, although when they each contained one hundred men the allowance of superficial area to each patient was but sixteen square feet, indicating that the invalids must have been in contact."

During the Spanish "Peninsular War" against the French under Marshal Soult, Sir James MacGrigor, Chief Medical Officer of the British contingent, established hospitals in the rear where the men were received en route to the depots, but there is an absence of detail to indicate the character of the field service provided for the reception and treatment of the wounded in the field.

M. le Docteur le Baron Larrey, describing the plans adopted by the French in the Italian war of 1859, adverts to their former experience thus: "At Constantinople, during the Crimean War, the hospitals were apparently very well established; the best buildings in Constantinople were assigned to them, and they were arranged with all the accuracy of organization which distinguishes the French. The results were not, however, favorable, especially in the spring of 1856, when typhus spread through many of the hospitals and caused great mortality. Taught by this experience, in 1859 the French distributed their sick in small hospitals whenever they could find a building."

From the foregoing it will be perceived that only two years prior to the commencement of the American War of the Rebellion French military surgeons clung to the belief that a permanent building was a necessary desideratum for the establishment of an hospital. One of the most valuable lessons taught by the experience of the American war of 1861-65 was the demonstration of the inestimable value of the tent as a hospital, and as a reliable substitute for the pick-up structures, obtained by chance, into which the sick and wounded of armies in the field were up to that time huddled.

Parkes, later Professor of Military Hygiene in the British Army Medical School, than whom there never has been a closer observer in all that concerns the comfort and welfare of the soldier, in the second edition, 1866, of his invaluable work on military hygiene, observed that: "The French, Austrian and American experience is in favor of having the hospitals in rear made of tents or wooden huts. They are largely used by the Federal Americans, who gave up entirely converting old buildings into hospitals."

In a later edition of that work de Chaumont, Professor of Military Hygiene at the Army Medical School at Netley, emphasizing his

convictions of the value of the tent, wrote: "That it will perhaps not be out of place again to write on the great advantages of temporary field hospitals over those located in permanent buildings in towns," and quotes the precepts of Hammond: "That nothing can be better for the sick and wounded, winter and summer, than a tent or a ridge-ventilated hut. The experience gained during the present war establishes this point beyond the possibility of a doubt. Cases of erysipelas or of hospital gangrene occurring in the old buildings, which were at one time unavoidably used as hospitals, but which are now almost displaced for the ridge-ventilated pavilions, immediately commenced to get well as soon as removed to tents. But in one instance that has come to my knowledge has hospital gangrene originated in a wooden pavilion hospital, and in no instance, as far as I am aware of, in a tent. * * * Again, wounds heal more rapidly in them, for the reason that the full benefit of the fresh air and the light are obtained. Even in fractures the beneficial effects are to be remarked."

De Chaumont sums up by saying: The hygiene of field hospitals in war (the rules are derived from our own Crimean experience, and that of the wars which have taken place since) as follows: "The field, including intermediate hospitals, to be made of tents."

It was laid down as a rule by Parkes in 1866, that the old regimental hospital was abolished, the sick being first treated in the field hospitals in rear, which are evacuated as occasion required by transfer of the patients to the general hospitals at the base. It is quite certain that good tents are much better than any buildings which can be got. * * * The Austrian experience seems to be in favor of making it of tents. * * * It must be a great advantage to have it made of tents; they have all the advantages of separate houses both as to ventilation and separation of patients; have excellent ventilation, can be shifted from ground to ground or place to place; erysipelas or hospital gangrene is extremely rare in them. * * * It seems now quite clear that these hospitals should not be the ordinary buildings of the country adopted as hospitals. Such a measure seldom succeeds, and the mere adoption is expensive,

though probably always imperfect. Churches should never be taken, as they are not only cold but often damp, then often exhalations from vaults."

Notwithstanding that the suitability and value of tents for field hospitals were clearly demonstrated during the great and protracted civil war in America, and their superiority over improvised hospitals was fully recognized by the best authorities on the subject, it is a matter of surprise to find that during the Franco-Prussian War the sick and wounded of the contending armies seldom received more than temporary professional treatment or relief on the field; those *hors de combat* were hurried to the base hospitals in the rear as rapidly as possible, and transported long distances to the towns and cities, where most of them were received into hospitals improvised to meet the sudden exigencies of active military service. It is true that the French might plead in extenuation their desire to secure possession of their invalids, but no such motive could have actuated the German authorities, as the rear of their armies was so thoroughly protected that the connection with their supplies and their homes was not at any time seriously endangered. And yet but few of their wounded were detained to receive the benefit of treatment in the field hospital. As to the character of the improvised hospitals prepared for the accommodation of the sick and wounded French soldiers, who fought so gallantly, under so many discouraging disadvantages, to maintain the renown of their arms and the glory of their country, the words of one of England's most observant writers afford a graphic picture of the condition of those whose misfortune caused their subjection to the baleful effects accompanying treatment in improvised hospitals in buildings compared with the beneficent results secured to their more fortunate comrades who were treated in tent hospitals *a la Americain*:

"The number of the wounded in my hotel has considerably diminished, owing to deaths among them. For the *Societe Internationale* to have made it their central ambulance was a great mistake. Owing to the want of ventilation, the simplest operations are usually fatal. Four out of five of those who have an arm or leg amputated die of pyaemia. Now, as in the American tents, four out of five re-

cover; and as French surgeons are as skillful as American surgeons, the average mortality in the two ambulances is a crucial proof of the advantages of the American tent system. Under their tents there is perfect ventilation, and yet the air is not cold. If their plans were universally adopted in hospitals, it is probable that many lives which are now sacrificed to the gases which are generated from operations, and which find no exit from buildings of stone or brick, would be saved. 'Our war,' said an American surgeon to me the other day, 'taught us that a large number of cubic inches of air is not enough for a sick man, but that air must be perpetually renewed by ventilation.'"

It would be difficult to find a stronger example of the advantages of tent hospitals and disadvantages of hospitals improvised in buildings than the illustration given in the terse and eloquent language of the disinterested and distinguished writer whose description was based upon observation of actual facts.

HOSPITAL SERVICE—ANGLO-EGYPTIAN WAR—1882-3.

The arrangements of the medical department of the army sent from England to Egypt, in 1882, appeared such as would amply provide against every emergency that could possibly arise. The field hospital service was organized and equipped in accordance with the improvements of modern science and practical observations gained since the American war of 1861-5, and was deemed adequate to meet the demands of active campaigning without having to resort to buildings for hospital use. The orders directed the field hospitals on the march to follow in rear of the headquarters and in front of all baggage, and were part of the general hospital service, arranged into movable, stationary and base. The arrangements that would doubtless have proved satisfactory were frustrated "through the culpable carelessness or mismanagement of some parties connected with the transport department service, as it appears that the vessel containing supplies for the field hospital service was not ordered to accompany the expeditionary force entering Egypt through the Suez canal. This oversight was a serious drawback to the usefulness and success of the medical department accompanying the troops in the field, and

resulted in the medical officers being obliged in many instances to resort to buildings utterly unsuitable for hospital purposes."

The principal medical officer, Surgeon General J. A. Hanbury, C. B., describing the sanitary condition of the army, wrote: * * * "On September 17th I arrived at Cairo, and on the following morning drove round the city with an Egyptian official for the purpose of selecting a suitable building or buildings for hospitals.

"Having inspected every building shown to me as available, the large structure in the Citadel, called the Mehemet Ali Palace, was chosen as the most suitable. Bad was the best in this instance. It was not a building I would have selected for a hospital had any other been possible, for no description can convey an idea of its filth at that time. * * * In addition to the ordinary latrines, which are in themselves most objectionable, every room seemed to have been used as a latrine, and on the floors there was a layer of dust, the accumulation of years."

With the facilities offered by the use of tents to secure ample hospital accommodations, with cleanliness and pure fresh air, it is difficult to understand why any urgency should have subjected the helpless sick to being thrust into such disgustingly unfit substitutes for field hospitals. Palaces, in name only, were less inviting than the meanest imaginable hovel. No one can wonder at learning that the unfortunate inmates soon sickened and died in great numbers, despite the fact that "day by day the scrubbing, washing and disinfecting the rooms and privies were carried on; but no remedy, save exposure to the air, was successful in removing the heavy foul smell which at first prevailed throughout."

"At Ghizaeh a field hospital was established in barracks cleaned out for that purpose. (!) A considerable portion of the barracks at Abassiyeh was at once submitted to a process of cleaning, disinfecting, lime-washing and painting, and when ready was open for the reception of the sick." (!)

"In this building (Palace at Ismalia) as in all Egyptian palaces, there was on each floor bath rooms and latrines of the usual Eastern pattern; simply an opening in the marble slab, down which all the excreta were suffered to pass."

After the description of those noisome substitutes for suitable hospitals it is some relief to learn that: "The tents of the enemy secured at Mahata and Mahameh were utilized (as was done on the battle-field of Shiloh in 1862) by our troops; and as soon as Kassassin was taken possession of, every effort was made to push forward the tents from Ismalia."

There can be little if any doubt that it would have been better for the interests and comfort of the invalids had they been cared for in the open, where any kind of shade from the sun's glare could have been secured, such as afforded by railway stations, verandas, etc., until the hospital tents could have been hurried to the front, than to have been subjected to the discomforts and dangers of these foul and loathsome buildings.

During the Nile Expedition for the relief of Khartoom, the building selected for an hospital at Wady Halfa was the railway station-house. It was well adapted for its purpose and afforded a great contrast to the hospitals at Assum. It was however supplemented by twenty tents and thirteen marquees.

During the Afghanistan war of 1878-80, the instructions for the management of the medical service of the force employed directed that the sick and wounded should be treated in domicile hospitals (field and base) the former of a mobile character. Nevertheless the reports indicate that at Cabool and Kandahar old and filthy buildings were used for hospitals.

In the Boer Rebellion some old huts, formerly used during the Zulu war were used for hospital purposes at Fort Anne, Newcastle, but they were supplemented by some forty-four (44) tents.

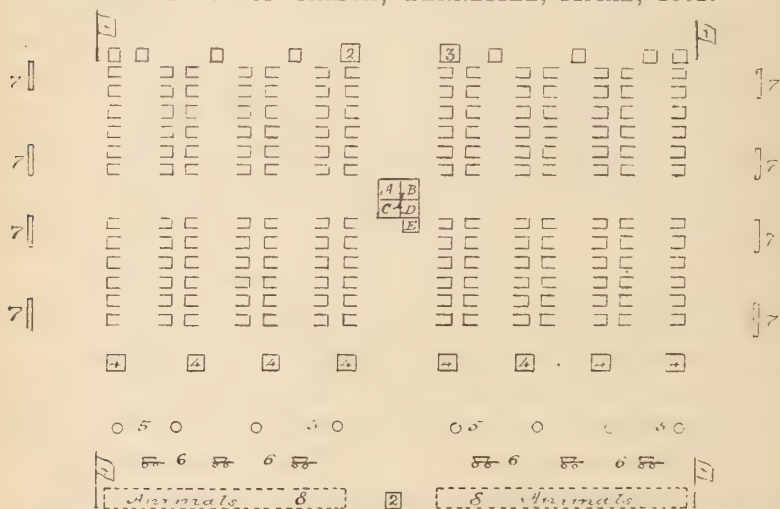
Although the British military authorities were amongst the earliest if not the first to take advantage of the lessons taught by the use of tent hospitals during the War of the American Rebellion, and reorganized their medical service in accordance therewith, it is passing strange to find that despite the excellence of their hospital service in personnel and equipment there should appear later on, during the Afghanistan, South African and Egyptian campaigns, a lingering tendency to cling to the building in which to collect and treat their invalids, instead of providing tents to be pitched on clean, healthy

sites, where freedom from polluted environments would have lessened discomfort and saved many valuable lives. With such tendency it is not surprising to know that the management of the medical department of the expeditionary forces engaged in Egypt during the last and latest war of any magnitude was not crowned with the measure of success which should have rewarded the efforts taken to render the working of that department of the British military service reliable, to provide against all contingencies in accordance with modern scientific experience.

The desideratum of a field hospital accompanying a military force on active service consists of being efficient. To be so it should be ready at all times and under every circumstance to afford the soldier stricken down by disease or by the missile of an enemy, prompt assistance and comfort, shelter and relief from sickness or injury, thereby tending to maintain him in fighting condition with as little loss of time and his strength as possible.

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PLAN OF FIRST TENT FIELD HOSPITAL ESTABLISHMENT ON THE
BATTLEFIELD OF SHILOH, TENNESSEE, APRIL, 1862.



1. Executive building; A, Office; B, Operating room; C, Dispensary; D, Dining room for officers; E, Kitchen; 2, Guard; 3, Stores; 4, Officers and sick officers; 5, Teamsters; 6, Ambulances and wagons; 7, Latrines; 9, Picket lines.

The above shows that the tent field hospital established April 6-7th, 1862, on the battlefield of Shiloh, Tennessee, consisted, as previously explained, of several hundred wall and hospital tents, arranged in parallel rows, forming avenues or streets that afforded ready ingress and egress, and facilities to insure thorough hygienic police of the grounds, tents and their environments. The structure utilized for executive purposes constituted the central point of the camp. The outer lines of tents on the right and left were faced inward, the next or second row with sufficient space for a wide street faced outward; the third line with back to back of second faced inward, the fourth outward and the fifth and sixth, forming the central avenue, inwards. Guard and store tents in front; those for hospital officials and invalid officers being arranged with special view to privacy and convenience. Latrines were erected laterally and in rear outside the tent lines. The ambulances, mules and their drivers were accommodated well to the rear of the hospital proper, so as to cause as little inconvenience as possible to the occupants of the establishment.

The arrangement of tent hospitals for the accommodation of large numbers of invalids necessarily varies according to the physical character of the ground and its environments, and more or less in accordance with the fancy of those charged with its organization.

BIBLIOGRAPHY.

1. The Intellectual Development of Europe. By W. N. Draper, M. D., LL. D., etc.

Principles of Military Surgery. John Hennen, M. D., R. S. E., Deputy Inspector General of Military Hospitals. 2d Ed. Edinburgh, 1820.

2. Outlines of Military Surgery. Sir George Ballingal, M. D., Professor of Military Surgery, etc. 5th Ed. Edinburgh, 1855.

2. The Medical Men of the Revolution—History of the Medical Department of the Continental Army. By J. M. Toner, M. D., Philadelphia, 1876.

3. History of the Medical Department of the United States Army. By Harvey E. Brown, Assistant Surgeon, U. S. A. Washington, 1873.

4. Notes on the Surgery of the War in the Crimea. By George H. Macloud, M. D., F. R. C. S. Lecturer on Military Surgery, etc. 1st Ed. Glasgow, 1858.
5. Des Hospiteaux, Tents et Barraques. Par M. W. Q. Gori, Docteur de Medecine, etc. Amsterdam, 1872.
7. The Iliad. Homer, Book 24, pg, 550, et seq.
8. Treatise on Gunshot Wounds. By J. G. Guthrie, F. R. S., Deputy Inspector of Military Hospitals. 3d Ed. London, 1827.
9. Medical and Surgical History of the War of the Rebellion, 1861-65. Surgeon General's Office, United States, Washington. Cyclopedia of Practical Medicine. Dr. H. von Ziemessen. Preface, etc., "Hygiene of Camps. By Charles Smart, M. B., A. M." New York, 1879.
10. Hygiene with reference to Military Service. By W. A. Hammond, M. D., Surgeon General, U. S. Army. Washington, 1864.
11. Notice sur l'Hygiene des Hospiteaux Militaires. Par M. Le Docteur Baron Larry. Paris, 1862.
12. Manual of Practical Hygiene. By A. Parkes, M. D., F. R. S., Professor of Military Hygiene in Army Medical School. 6th Edition. By F. S. B. Francois De Chamont, Professor of Military Surgery at Army Military School, Netley.
13. Besieged Residents in Paris. Labouchere.
14. Report of the Army Medical Department—British. London, 1880.
14. Report of the Army Medical Department—British. 1884.

BRIEF NOTES ON SHIP, HOSPITAL, BARRACK AND CAMP FURNITURE, AND ON ELECTRIC HEATING AND COOKING.

BY CHRISTOPHER J. CLEBORNE, M. D.,

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Among matters likely to engage the attention of military and naval surgeons, few are of more importance to the health, comfort and general welfare of enlisted men than the furniture and appurtenances of ships, hospitals, barracks and camps.

Trite as the subject is, it deserves more consideration, though in this paper only the merest outline can be given of a few important points, and these will be briefly considered.

THE HOSPITAL AMBULANCE.

The modern Army Ambulance is so well adapted for its purposes that it need not be considered, but those usually made for Civic and Naval Hospitals are too heavy, and are but indifferently fitted with necessary appliances.

Probably the most convenient and complete type for city use, is the "St. John Association" Ambulance recently exhibited at the World's Fair. It is, however, too heavy and expensive, and a lighter, cheaper vehicle would answer every purpose.

A Naval Hospital Ambulance, weighing about 1200 pounds can be made to accommodate ten or a dozen persons—say two lying down, and eight or ten seated. The body ought to be set as low as practicable, say eighteen to twenty inches from the ground floor of vehicle, and should be fitted with two folding steps opening and shutting with the door. To insure greater lightness, strength and freedom from shrinkage, Berlin Papier-Mache may be used for the body in place of poplar, and there should be "drop down windows" in front, sides and back, to secure good light and ventilation. The driver's seat, with locker underneath, ought to be wide enough to accommodate three persons, and should be well shaded from the sun and rain. Inside, the seats—fitted underneath with splints—should

be made to drop and be removable, so as to leave the whole interior space for stores, if necessary. An inside water tank and medicine-locker might also be fitted. The floor should have grooves or travelers to slide the stretcher or wicker-cradle with its mattress, and when not in use, the cradle (made to fold up flat) may be snugly suspended out of the way at top or roof of ambulance. The wheels—plain or rubber-tired—should turn full under in front, so as to make a quick, short circle, and the springs, which are most important, may be so set as to reduce the usual violent jar to little more than a vibration. For this purpose the semi-elliptic, or better still, the long scroll-elliptic spring should be used, and to take up further movement, the inside seats covered with leather can be made of Hartford spring-wire netting.

An ambulance on this plan, plainly upholstered and furnished with pole, shafts and lamps, could be built in a first-class manner for six hundred dollars, or less than one half the price usually charged for a heavier and inferior article.

HOSPITAL BEDSTEAD AND BEDDING.

A bedstead is an important if not necessary means for securing sleep—that sound refreshing sleep which quaint old Burton says “is a sufficient remedy of itself without other physic.” On ship-board, of course, there is no substitute for a well made canvas hammock or cot, which, if well aired and its contents kept clean and dry, affords the best and easiest means of insuring rest.

On shore, in hospitals, barracks and camps, the modern iron bedstead, single or “double-banked,” seems to have taken the place of all others. It is to be found in every variety of form in round or flat, wrought, malleable or cast-iron, with slat bottoms or woven wire mattresses on wooden or iron frames.

In the manufacture of these, the Hartford Company has earned an enviable reputation. The ideal war bedstead should be made entirely of metal, light and strong, easily and quickly set up or taken apart, and be as free as possible from ornament, cracks, crevices or anything that will hold dust or vermin. In the main, these indications have been fulfilled in the pipe-iron bedstead, weighing with

its wire mattress, from 120 to 140 pounds, which can be taken apart in from three to seven minutes, by the aid of a bed-wrench or screw-driver.

Quite recently, a "Naval Hospital bedstead *" has been devised which it is believed possesses some superior advantages. It is made entirely of pipe-iron, has no angles, crevices nor spaces in which dust or vermin could collect. It weighs with its woven-wire mattress but 75 pounds, is put together without screws, nuts, bolts, rings, or other devices requiring the use of a bed-wrench or screwdriver, is locked or unlocked by two simple movements in one second, can be set up in five seconds, and taken apart ready for removal or transportation in nine seconds. It can be fitted with any kind of woven-wire mattress, and the latter can be stretched or extended to any degree of flexibility or tension by a "screw extender" attached to the bed lock. If the wire mattress is fitted with the "bed lock and screw extender," it can be used as a field stretcher, camp bedstead, trundle-bed or cot, for the handles (which can be utilized also as legs) can be concealed in the tubular sides of the mattress, and may be fitted at once to the bed lock, to make the mattress into a stretcher, cot or lounge, or an inclined plane for surgical purposes. The price of this bedstead with its woven-wire mattress is fifteen to twenty per cent cheaper than others of a similar class possessing less advantages. If it should be necessary to warm the bed for a case of vasomotor paralysis, shock or collapse from any cause, or whenever the use of external heat is needed, it may be done promptly (if the hospital, ship or room is provided with the electrical current) by connecting the wire mattress with a portable electric heater, or better still, the patient may be enveloped in an O'Neill "electric blanket" or wrap, by which ingenious device, a regular temperature, 100 to 160 deg. F. or more, may be obtained. By the use of this wrap the effect of a Turkish bath may be had in a very short time, and it can be used as a blanket or robe to keep patients warm while sitting in a hospital

*Naval Hospital bedsteads fitted with this invention (the Cleborne "bayonet-catch bed lock") are now manufactured by the Hartford Company, and by the Merimack Company of Boston, in combination with its A. K. spring mattress.

ward, or as a carriage rug or foot warmer, for it will retain its warmth for hours after being once electrically heated.

HOSPITAL BEDDING.

For filling mattresses, nothing equals the first quality of long curled hair, but it is too costly for general use. Next to this, is a cheaper variety of hair known as "South American," which curls fairly well, retains its "life" and is good enough for hospital purposes. A great number of substitutes have been proposed—Excelsior, millpuff, sponge clippings, Southern moss, African fibre, cotton, Ostermeyer's felt, etc., and a very good filling may be made of cedar shavings, pine needles, and cat-tail down, but all these have the disadvantage of "matting" after a few month's use. Much depends upon the way in which a mattress is made; the ticking should be of the best quality, the tuftings not too deep, the edges of the ticking ought to be "insewed" so as to leave no resting place for the nits of insects, the mattress should be double or "cross-thumbed," and not less than four inches in thickness, as a thin mattress is usually very uncomfortable.

For summer use on a woven-wire mattress a most healthful, comfortable and well ventilated bed mat may be made by interposing between two layers of quarter or half inch felt, one or more layers of very thick Japanese sponge-paper, the layers of felt and paper being held together by eyelet holes, and the edges finished with mattress binding. A mat of less than one inch in thickness is sufficient to cover the harsh feeling of the woven wire, and the cost of such a mattress or mat would be less than two dollars. In this connection I may add that it is desirable to have the bedsteads, bedding and bed-clothing made of a standard quality and pattern, in order to secure uniformity in appearance in hospital wards and barracks.

WARD FURNITURE.

Chairs, tables, settees and clothes-closets used in a hospital ward should be made of "Kyanized Austrian bent-wood," or of some light metal like that used in the Kayson aseptic furniture.

The ward closets in Naval Hospitals might be combined with a seat and table top, and made of light sheet metal with sides of wire

netting, so that the contents of the closets may be easily examined at inspection, and be readily disinfected by heat.

The less furniture there is in a ward or sick room the better, and what there is should be made as aseptic as possible.

HOSPITAL CREMATORY AND DISINFECTING CHAMBER.

Every ship, hospital and barracks should be provided with a "garbage crematory" for the immediate destruction of waste animal and vegetable matter, ward sweepings, old bandages, dressings, etc., and also with a hot air or steam chamber, large enough to disinfect iron bedsteads, wire mattresses, bedding and patients' clothing. One of the best forms is the "Engle Crematory," which is made in several sizes for hospital or domestic use, and to this might be attached or connected a disinfecting chamber for the purposes already mentioned. The mode of combustion may be by coal, gas or other fuel, or preferably by electricity, and the disinfecting chamber should certainly be heated by the latter, as it is essentially a dry heat, can be easily regulated in temperature, and is less liable to destroy the texture or discharge the color of the uniforms of sailors or marines.

WATER FILTERS AND WATER COOLERS.

It goes without saying, that the best and surest way of purifying water for hospital and domestic purposes, is by distillation or frequent boiling, but when a Loomis, West or other steam sterilizer is not furnished, the next best method is by filtration. The market is flooded with devices for this purpose, among the best the "Pasteur Filter" and its numerous modifications, but according to Koch's latest experiments, no filter has yet been devised that is absolutely "germ proof."

When possible, it is always best to pass through any hospital or domestic filter, cooled boiled water, and an excellent filter and cooler can be cheaply made as follows: The water receptacle should be of two thicknesses of metal (Aluminum, or sheet-iron oxidized by Barff-Bower process) lined between with felt or wood pulp. There should be an upper and lower chamber surrounding a central ice cylinder, and to the latter may be attached the required number of Pasteur or other bisque tubes (filled with spongy iron), which should be enclosed in an asbestos covering or case connected by a tube with the lower chamber, and so arranged as to be easily removed for cleaning by the

action of fire. The ice chamber should be filled with ice broken in small pieces, as in "artificial cube ice." These pieces being wetted by water, the boundary of the watery film surrounding them is concave, and this concavity implies a diminution of pressure in the interior, melting of the ice occurs at places of contact, and the cold thus evolved freezes the adjacent portions of the watery film which being at less than atmospheric pressure will begin to freeze at a temperature a little above the normal freezing point. The result of capillary action on force at the boundaries of a film of water which connects the broken ice thus brought in contact produces an effect equivalent to attraction, and this phenomenon of regelation results in cooling and in keeping cool the surrounding water better than by the old-fashioned way of putting lumps or cakes of ice above, below or around the filtered water in the cooler. In this way all the water is quickly cooled and the ice is not mixed with nor brought in contact with the filtered water, so that the best result is obtained.

ELECTRIC COOKING AND HEATING.

Not least among the startling and numerous developments of electricity, is its recent adaptation to cooking, and now that ships, hospitals and barracks are being lighted by direct or alternating currents, there will be no difficulty in procuring power for this purpose economically, while in cities having central stations the necessary current may be had for domestic use at 5c per horse power hour. Even at this rate electricity will not compete in cheapness with coal or gas, but its advantages will be the more readily appreciated when we reflect that though it may be a little more costly, it is more healthful, easily regulated, and is free from dust, dirt, smoke, odor and ashes. The common coal efficiency of the average ship's galley and hospital range is but three to four per cent (showing that for every twenty-seven pounds of coal burned twenty-six pounds are thrown away), while the heat efficiency of the current from the central station is about six per cent.

There is therefore sufficient margin between the heat efficiency of three per cent and one of six per cent to warrant the use of electricity in ships, hospitals and at naval stations. It will be found particularly useful on shipboard, where the time of cooking is the

time of least lighting, and vice versa, and in summer or in hot climates, when it is desirable to limit heat radiation from the ship's galley in limited quarters.

In hospitals there is the widest field for electric heating in kitchens, laundry and mess rooms, and for medical and surgical purposes. It is of course too expensive even at 2c per horse power for general heating, but it would be an excellent auxiliary to steam, hot water, or hot air radiation, and for warming small places, like bath rooms, water closets and pantries.

For ship's cooking it offers many advantages. I have recently seen an Automatic Electrical Cooking Range, with Aluminum utensils, whereby labor and dust were reduced to a minimum. The top of this range was arranged for high and medium temperatures, so that any degree of heat might be secured, and by removing the cooking utensil from its place, the current was instantly turned off, effectually preventing waste and any risk of fire.

Sufficient tests of electrical cooking and heating have already been made to satisfy the most skeptical as to safety, economy and efficiency. A luncheon for twenty persons prepared on a hot July day (temperature 90 deg. F. in the shade), without the slightest discomfort to the cook, may serve as an example. The cost of current was estimated at 5c per horse power hour, and the time given in each case, is the time that was required for the completion of cooking:

Utensils Used for Cooking.	Article Cooked.	Time Used in Cooking.	Current.	Amperes Minutes.
Oven	12 lbs. beef..... 1 doz. rolls..... 3 doz. potatoes 1 loaf bread...	90 minutes.	11.5	1035
Broiler	4 lbs. steak..... 1 doz. chops...	15 "	19.5	292.5
Chafing dish	Green peas	30 "	4.	120
Frying pan	Fish	30 "	9.2	276
	Potatoes			
Coffee pot.....	Coffee	10 "	5.6	56

At \$.2375 for cost of current for this luncheon, it will be seen that this is but a trifle more than one cent per plate for cooking, so it is evident even at the present high price per horse power that electricity can be economically used on board ship and at hospitals and barracks, to say nothing of its cleanliness, quickness and increased comfort to the cooks and others in hot weather.

Another advantage is the shorter time required for heating food and fluids, as shown by the following experiment: A pint of water @ 48 deg. F. was placed in a three-quart tea kettle and the current was turned on at 9.14 a. m. At 9.25.40 it was 212 deg. F., at this point the current was shut off, and the water continued to boil till 9.32.10. At 9.55 the temperature was still 170 deg. F.; it was then cooled off and at 10.15 was filled with 6 pints of water at 50 deg. F., and at 10.51 temperature was 212 deg. F.—Time to boil three quarts of water 35 min. 30 sec.

An aluminum dish (and just here let me say that nearly all cooking utensils should be of that metal), was filled with one quart of water, temperature 58 deg. F., and the current was turned on at 9.28.15, and at 10.02 the water was boiling.

An electric oven (large enough to roast 20 or 30 pounds of beef), had the current turned on in a temperature of 60 deg. F. at 10.27 a. m., by 10.42 it was hot enough to roast meat, and by 11 a. m. the oven was heated to 511 deg. F. At same time and at same temperature, the current was turned on an electric broiler at 11.45, by 11.53 it was hot enough to broil, and by 12.25 the broiler charred paper, showing the heat to be over 600 deg. F.

On an electric broiler chops show the marks of the bars and do not look the rich brown so pleasing to the eye and taste of the epicure, but the juices of the meat are well retained, and Osmazome is fully developed. In well constructed electric cooking utensils and ovens, the heat is dry and concentrated, meats require for roasting from one hour to one hour and twenty minutes, bread is baked in twenty-two minutes and biscuits in ten, steaks and chops require ten to twelve minutes on the electric broiler, but the heat is too dry for some meats, and unless properly regulated and managed, joints may not be evenly cooked in the middle. This difficulty may be obviated by

gauze or asbestos screens or aluminum wire grills. Of course there is always a loss of weight in meat during the process of roasting, varying from 20 to 40 per cent in the ordinary ovens, and in the electric oven about 18 to 20 per cent; but this loss may be reduced to 10 per cent by an asbestos screen. The heat efficiency of an electric range is about 85 per cent, and the average running current for cooking will approximate 20 amperes.

The practical result of these tests shows that for ordinary cooking the electrical oven should be heated about twenty minutes before it is used, and the broiler about seven minutes before cooking.

As to cost, a lighting current at 1c per ampere hour, and 5c per horse power hour for heating, are extortionate charges, when every expert electrician knows that the former could be supplied at five-eighths of a cent, and the latter for \$.025 per H. P. H. with profit to the vendor.

In this paper it has only been possible to call attention to a few of the more important subjects, but I trust enough has been said to awaken further interest in them.

THE MEDICAL OFFICER AT THE SUMMER ENCAMPMENT.

BY LIEUT. COL. CHARLES R. GREENLEAF,

Deputy Surgeon General United States Army.

It has been my good fortune to attend during the past six years the annual encampments of the National Guard in several of the States, and to observe for the purpose of criticism the duties performed by its Medical Officers and the methods they pursued in performing them. In point of professional attention to and care of the sick, in intelligent advice as to the hygiene of the troops, and in the sanitary care of the camps there was little to say save in commendation, but in a failure to utilize the means at hand for instruction in the service that would be required of the Medical Department in the field there was room for some adverse criticism. I did not see much systematic drilling of the attendants (or men of the Hospital Corps), in the handling of stretchers or of helpless men; in the loading and

unloading of ambulances and railway cars. There was but little instruction of officers or men either by lectures or recitations in administrative methods such as the preparation of routine reports, the care and management of hospitals and transports; or the procedures necessary for the removal, shelter and care of wounded after a battle as at first dressing station or in field and base hospitals—in fact, there was a too general ignoring of the administrative duties of an army medical officer, and an absence of the discipline upon which the successful performance of these duties is founded. This failure did not result from indifference, because without exception I found medical officers zealous almost to enthusiasm and ever ready to learn, but they did not fully appreciate the importance of these particular functions and in some instances were inclined to regard their study unnecessary, and with respect to the drilling and discipline of attendants as *infra dig.* or child's play. Earnest in endeavor to modernize the personnel of their department by legislative changes and singularly successful in many cases, but little effort had been made to render this personnel effective in the peculiar field where its services may be invaluable.

It is little wonder that the National Guardsman whose 51 weeks of civilian life are passed in exclusively professional thought should during his one week of military life overlook or possibly hold in small account these administrative methods and drills and discipline of his Hospital Corps, but if he will think for a moment that upon his shoulders in time of war rests the responsibility for providing shelter, food, clothing, medicines and surgical appliances for the sick and wounded he is to care for, and ask himself in what manner he is to get these things, or if he will think of that other and equally grave responsibility for promptly removing the wounded from the field of battle and transporting them to a place of safety and shelter and ask himself how he is to do it, his views on medico-military administration and the necessity for discipline will certainly change.

In the medical as well as in all other military departments the prime factor of success in time of war is discipline; without it efficiency is impossible and to obtain and enforce it the officers of this department have been invested with military rank and authority.

In civil life the doctor has no necessity for the exercise of discipline except in ordering his own conduct. The personnel and material of the hospitals in which he labors is furnished and controlled by laymen; the emergency or street service to which he may be called is governed by the police; his function is purely professional. In military life this personnel and material is entirely under his control; his functions as a medical officer are of a dual character, professional and administrative. These latter are paramount on the field of battle, immediately after a battle and in the hospitals, particularly those near a battlefield. In order that he may perform them efficiently he is supplied with a large number of men, some professional, many laymen, and to secure from them that "habit of subordination" which will insure obedience to his directions and their fulfillment "as if by second nature," is discipline. While the Medical Department of our Army won for itself undying fame by its skillful administration in the War of the Rebellion, a charitable silence covers its faults of omission and commission in the commencement of that war; the price that was paid for later efficiency can never be computed nor will the story of needless suffering and loss of life ever be told. Those of us who entered service when the war began had no such opportunities for practical instructions as you have in the school of the encampment; our school was the rude and often rough one in the field; it is therefore incumbent upon the young men now on the stage of active military life to avoid these errors and to prevent a like suffering in the war of the future, by diligent and faithful work, learning from Regulations and Drill Books what to do and how to do it; applying your knowledge in frequent drills and recitations as the only way to secure practical results for yourselves, your subordinates and the disabled, for whose relief it is your mission to serve.

The purpose of these encampments is to furnish as nearly as possible in a time of peace instruction by object lessons in the conditions that exist or that may arise during war either in camp or during battles—it is therefore necessary that all the duties and functions should be performed with such thoroughness, zeal and realism as will insure the interested attention of all the participants.

The books I have mentioned give technical directions concerning the methods of these functions and I do not know of any better way of setting forth the proper manner of their performance than by telling you what I saw last October at the manoeuvres of the Medical Department of the French Army in the field at Pautin, a little village near Paris, where nothing was lacking except bullets and blood to complete the realism of the function. It may be said that such perfection of mimicry is impossible with the small number of troops we gather in an encampment—not so—the same interest and earnestness put into similar work with never so few troops, will produce equally good results.

These manoeuvres were planned and executed on an extensive scale and were for the purpose of instruction by object lessons to the medical officers of the Paris contingent of the National Guard, who numbered several hundred, in their field duties. A large body of troops intended to represent a Division of Infantry on the march and engaged in battle was detailed to assist, and was composed of detachments from the Infantry and Artillery regiments forming the garrison of Paris. The troops were commanded by a General of Division; a medical officer of high rank in the Regular Army served as the technical director of the sanitary functions, being assisted by a number of medical officers also of the regular Army and Navy. The Surgeon General of the Army and his staff were present. Preliminary to service in the field, two days were allotted to general descriptions of the material in use, and instructions in methods of using it.

The morning of the first day was occupied by a medical officer of the Army in describing such new material as had been introduced during the past year, the articles being present for inspection; similar descriptions of old material were given to those officers who were new to the service. An officer of the Supply Department described the carriages, harness and other equipment belonging to this department that were likely to be incidentally used as a part of the "Ambulance." The opportunity was improved to impress upon the younger men the grave responsibility resting upon them in the use of this material which was entirely under their command when operating in the field.

In the evening a medical officer of rank and experience addressed the officers on the various sanitary functions in field service, such as the location and use of first aid stations, field and base hospitals, etc.; the general principles governing mobilizations and the duties of medical officers at that time. On the morning of the second day a military officer explained the order of movements which the troops would make in the coming field exercises, their line of march, the selection of camps, and the grand tactics of the fight, with suggestions as to the relation of the Medical Department to the troops on such an occasion. In the evening the arrangement of the several groups of sanitary function to be performed the next day was announced, explained and discussed; the location of the Division Ambulance, base and field hospitals given; the wagons, etc., were loaded and the duties of the several officers and their attendants assigned.

On the morning of the third day the troops commenced their march from Paris to the field of action.

The General of the Division had separated the troops into two lines of opposing forces, and the foreign guests were furnished with maps showing the roads traveled, the lines upon which the various military movements would be made, and the location of the first aid, ambulance, field and base hospital stations; several medical officers of the Army and the Navy were detailed to accompany the foreign guests and to explain to them the movements and functions as they were performed.

About 150 soldiers of the line were detailed to play the part of wounded men, and each was furnished with a card on which was written a description of the wounds he was supposed to have. With a view of adding to the realistic feature of the functions, and of demonstrating the fact that the wounded do not all fall at once, but only after successive volleys of fire, it was arranged that during the several stages of the fight a certain number of the "dummies" were to fall at a given signal, the numbers being determined by the known percentages of wounded following different characters of fire; thus during the skirmish preliminary to an attack a small number were to fall; in the first attack a greater number; in the grand assault a still

greater; and during the retreat a less number; to accomplish this, the descriptive cards that were given to the men were of different colors, blue, yellow, violet and green. After the skirmish fire the signal was given and the men holding blue cards were to fall, after the first attack those holding yellow cards were to fall, then those holding violet cards, and finally those holding green cards; the men were instructed to remain on the ground where they fell until removed by the members of the Sanitary Corps who came to their relief.

When the firing commenced each regimental surgeon sent a suitable detachment of the regimental ambulance, under command of an officer, to locate the first dressing station as near to the line of fire as prudence would allow, and when the roll of the drum indicated that men had fallen the stretcher bearers and other attendants were sent out to bring them to the stations, which soon assumed a busy appearance. I should here state that in the companies of the line certain men are designated to perform the functions given to our company bearers; they are known as members of St. Andrew's Cross, and wear a brassard of red, bearing a white cross; they are not neutralized.

Arriving at the first aid stations the bearers laid their stretchers on the ground, and either waited orders or took other stretchers again to the line; the surgeons proceeded to examine and to dress the wounds, sending those men who were slightly injured back to the firing line under charge of such white-cross men as were available, and those more severely wounded to the ambulance station that had been located about half a mile to the rear and on the roadside; an assistant, provided with a memorandum book, took notes of the name, organization, character of wound and disposition made of each case.

At the ambulance station a further sorting of the cases was made, those whose wounds would not permit of further transportation were treated on the spot; the remainder were sent to the base hospital; an operating table forms a part of the ambulance material, and it was here that primary or emergency operations were performed.

When the advance of the firing line had left the dressing station too far in the rear, the surgeon in charge left the wounded in care of

his subordinates, and with a portion of his force and material moved to another station nearer the scene of action, the one he left becoming an ambulance station; likewise the surgeon of the ambulance station, when he found it overcrowded, looked about for a house or hamlet that he could convert into a base hospital, into which his most serious cases could be placed.

At the ambulance station the loading of the wagons (ambulances) was conducted with great care and under the direction of an officer who was furnished with a memorandum book, in which he made a duplicate of the patient's record that was made at the first aid station.

The base hospital was located in a deserted mansion around which had been clustered a number of poor dwellings, the homes of peasants; in the yard several tents of the "turtle back" pattern had been pitched and at the time of my arrival it presented a scene that recalled vividly the events of 1862; a couple of ambulances were being unloaded at the principal door of the house, in the yard stood several mules carrying cacolets that were occupied by men who were bandaged in a variety of ways, and about the door of the tent were stretchers resting on the ground occupied by men similarly adorned with bandages. Inside the house, the first room to the right was used as a receiving room, where the clerical attendants were busy with the hospital register, reports, and other writings connected with the service that was going on. On the other side of the hall was an improvised dispensary, back of which, in a larger room, was an operating table, and a corps of surgeons dressed in the conventional garb of such places; that is, each one had removed his coat and donned a long operating apron and operating sleeves. As I entered the room, which was crowded with medical officers, the Chief Surgeon was giving a clinical lecture on a gunshot wound of the knee joint that required amputation; the "dummy" lay on the table, surrounded by the customary assistants, one with an anaesthetic, another with towels and sponges, another with extra ligatures, while two others held the limb of the poor man whom I almost feared might fall a victim to the enthusiasm of the surgeons, inspired by the highly realistic performances of the day. I witnessed a similar scene in an outbuilding that had been taken as an operating room, the patient in this case having

a perforating wound of the abdomen; the other rooms in the house were utilized as wards, the floors having been covered with straw for the reception of patients. In the kitchen the cooks were occupied in preparing the food which had been furnished by the Commissary Department, of the same kind and quality issued to troops in active campaign. I was told that this was supplemented by small requisitions made upon the neighbors.

At some distance from the base hospital was another large field base hospital, located on the bank of a small stream; this hospital was intended as a demonstration of tentage and improvised shelter; the tents were the "turtle" shape and had as an auxiliary support an ambulance wagon backed in at one of the entrances, that portion of the tent being fastened to the wagon. A Ducker movable hospital was also in position and occupied, and several other improvised shelters made by utilizing canvas and the boughs of trees were exhibited; a large display of surgical dressings, field cases, new splints and other material was shown.

At nightfall, the wheeled transportation was ordered to rejoin the division, the medical officers returned to Paris, and the wounded were required to remain as they were, being comfortably housed, for the demonstrations of the next day.

On the morning of the fourth day the transfer of the wounded from the base hospital to permanent hospitals in the city was commenced, the routes chosen being by canal and railway; the distance from the base hospital to these two routes was utilized to demonstrate improvised means of transportation, and for this purpose the country wagons and carts were obtained from the inhabitants; they were liberally provided with straw; some had rude springs made of saplings placed in various positions on the sides and floor, on which stretchers were laid; others utilized the bows over which the wagon covers are stretched as points for suspension of stretchers by means of gun slings, etc., while others had seats made of rough boards for the use of those who could be transported in that way. Detachments of sanitary service men were sent to the places of rendezvous at the canal and railway stations to prepare boats and cars for the patients; the former were fitted with blankets, clothing and straw as improvised

beds, and in the latter was placed the iron frame work designed for this purpose; each frame is fitted with suspension springs that are not unlike those used in steelyards; the steel is very carefully tested for imperfections. At the free end of each spring a broad ring is fastened to receive the handles of the stretcher; four stretchers are carried on the frame, one above the other; medical officers, attendants and medical supplies are placed in the cars and boats, and the convoy starts for its destination; this is at one of the outlying stations of Paris, where the wounded are disembarked and sent to the garrison hospital; the medical officers and attendants return to their proper and permanent stations, and the manoeuvres are ended.

I was much impressed with the spirit that was displayed by those who were connected with and took part in these exercises; all were deeply interested, and the actors were as free from levity as if the business in hand was in reality the serious one of war. The lesson could not fail of leaving a lasting impression upon the officers for whose benefit it was given, that will bear good fruit when their services shall be required in the field.

DIET OF THE NATIONAL GUARD AT SUMMER ENCAMPMENTS.

BY FIRST LIEUT. CHARLES WILLIAM GALLOUPE,

Assistant Surgeon Battery A, Light Artillery, Mass. V. M.

The most arduous duty required of the surgeon of the National Guard in time of peace is the supervision of the hygiene of the summer encampment, together with the care of those actually sick or injured. Whatever concerns this duty must therefore be a matter of interest to us, whether we are enrolled in the body of conscientious servants of the State, or whether our object is to reduce the position of the militia surgeon to a sinecure, and secure for ourselves the pleasures of a week's picnic at the expense of our awe-struck fellow-taxpayers. In either case it is for our interest to reduce the size of the sick list, and keep the men active in the discharge of the duties of the citizen soldier. In Massachusetts no man can be excused from duty at the summer encampment for sickness, except on the certificate of a

competent medical man; and, on the other hand, if any question arises in the mind of the Captain, as to the ability of any of his men to perform their full duty, it is the custom to ask the advice of the surgeon of the command. Furthermore, as a merciful man is merciful to his beast, every horse that goes to camp has had his three-minute kick against the rectal thermometer. By this means the material placed in our hands is warranted sound in wind and limb. With such a promising outfit, what actually happens? An experience of six years has shown me that within forty-eight hours of their proud entry upon the field, five to ten per cent of the men are "hors de combat" and the enemy that has accomplished this decimation is acute indigestion. To be sure, some have succumbed to enforced insomnia, some to the serious casualties of foot ball, some to the unaccustomed fatigue of military duties, and perhaps, in rare instances, the cup that cheers has marked for its victim the all-too-enthusiastic recruit. But the morning sick report runs, as a rule, on the brief gamut of cramps, vomiting, diarrhoea, constipation, headache; for all of which the sovereign remedy in the soldier's mind is that time-honored blue and white paper parcel, variously asked for as "seedless," "settler's" and "settlin's" powder—the very name of "settling powder" acting almost as a charm on the outraged organs of digestion.

Many causes predispose to dyspepsia, such as the unusual fatigue of drill and guard duty in men of sedentary occupations; the loss of sleep from the novelty of their surroundings, from unaccustomed noise, and the glare of the morning sun on the tents, and also from the inopportune visits of self-invited comrades. But the chief cause of acute attacks of indigestion is the change from simple and regular meals to a mixed and injudicious bill of fare, supplemented by fruits and constant potations of lemonade and other so-called "soft-drinks," with an occasional addition of liquors of a harder sort. Under the system that obtains in Massachusetts, the companies cater for themselves independently, each having its own cook house and mess tent, and paying for its meals out of the company fund at a usual rate of \$1.50 per diem. The inclination of the men leads them to demand as elaborate a menu as the treasury will allow, including such indigestibles as pie and lobster salad in the companies that boast a

large exchequer, while the more economical can reach the same haven of dyspepsia through the more humble means of fried steak and pork.

The inspection of food from a hygienic standpoint has never yet been asked for by the State authorities, although the custom that obtains in the navy—the official sampling of each dish before it appears on the table—is well known and approved. Under the present system of company catering, the testing of each dish by a medical officer would be impossible on account of the time and labor required, and the necessary discrimination against inefficient cooks would lead to endless disputes, and perhaps to more “heart-burnings” than the offending food itself. Submitting the bill of fare for each day to the criticism of the medical officer would insure the exclusion of notoriously offending articles, but would not serve as a bar to poorly-cooked food, nor to meats improperly cut or tainted and spoiled. An inspection of the food as it goes on the table is the only means of securing the good and excluding the bad. The caterers certainly deserve a charitable word, inasmuch as expert cooks may fail in the first few days of experimentation in out-door cooking in temporary shanties, with stoves that are minus an efficient flue, and with the absence of all accustomed conveniences for storing the food and fuel; while, at the same time, there is the exceptional task of serving a large number of hungry and impatient men with hot and palatable food in the open air.

Some of the evils of company messing could be obviated by placing the contract for feeding an entire regiment in the hands of one caterer. This would secure a uniform bill of fare for all, and would allow the medical officer to select and arrange the articles from a hygienic standpoint; but no conscientious endorsement of the actual meals could be given without a personal sampling three times a day of the products of fourteen separate cook houses—an ordeal before which the stoutest medical heart would quail. This experiment was tried, however, by my advice, in the Eighth Regiment, Mass. V. M., at its summer encampment of July, 1892. The contract for feeding the entire command of about six hundred men, together

with invited guests, was awarded to a single caterer, at a fixed price of fifty cents per meal, and the bills of fare for the fifteen meals (Monday to Saturday) were selected by the caterer and myself in consultation. They read as follows:

Breakfast consisted of hot bread (biscuit or corn cakes); potatoes (baked, lyonnaise, stewed, or hashed and browned); eggs (boiled and fried); and one form of hot meat, either broiled beefsteak, mutton chops or meat hash. Coffee.

Dinner consisted of soup, meat (beef, mutton, fowl or chicken), with occasionally a fish course; potatoes, with one or two additional vegetables. A dessert of some simple pudding (like tapioca, bread or custard), or ice cream and cake. Fruits (watermelons, oranges, bananas). Coffee.

Supper consisted of hot bread (tea biscuits or muffins); cold meats; one hot dish (such as hash, baked beans, omelettes, bluefish or mackerel); a simple preserve or fresh berries; coffee, tea, cocoa.

At all meals cold bread, butter and milk in unlimited quantities.

Such menus ought to be satisfactory, but the soldier's inalienable right to kick was not to be evaded so easily. My method of inspection was to visit each mess tent (fourteen in number, one for each of the twelve companies, one for band and field music, and one for headquarters) as soon as the men were seated, and examine the food and listen to their complaints. This was no sinecure. In general, the article most condemned was the meat, on account of unpalatable cooking or a scantiness of the best cuts. These criticisms were, I was forced to admit, well founded, and it was no balm to the wounded feelings of the men to assure them that the officers and men were all treated alike, for they well knew that the self interest of the caterer would lead him to send the best cook and the best cuts of meat to the headquarters mess. The dishes invariably praised were meat hash, lyonnaise potatoes and baked beans, and when such articles figured conspicuously on the table, the answer to my question "How is the food to-night, boys?" was always a stentorian "Out of sight." The reasons for the popularity of these dishes, were, I think, that such articles were uniform in quality so that there was no ground for unfavorable comparison with other tables; because

they were within the range of successful field cookery, and were, moreover, staples of the home cuisine, so that their good quality was appreciated. In regard to the criticism of the meats, the economical spirit of the caterer led him occasionally to class as roasts some pieces that were only suitable for the soup kettle, while the complaints of poor cookery were generally due to actual inefficiency on the part of some cook. A point not foreseen was the necessity of more waiters than are ordinarily provided for the same number of men, in order to get the food on the table rapidly enough to keep it hot and palatable, and to satisfy the clamor of the men.

This experiment in regimental catering was, however, from a hygienic standpoint, a notable success, and there were very few to report at surgeon's call, in place of the customary thirty or forty victims of distended heads and collapsed abdomens, while after the first two days there was practically no sickness at all.

On the whole, I should certainly favor the adoption of this method, with such improvements as could be easily introduced. The erection by the State of a large, permanent structure for kitchen and mess house, would secure uniform and satisfactory cooking, inasmuch as good ovens and chimneys could be built, and cold storage rooms on a suitable scale provided. By a recent bill the State of Massachusetts has authorized an expenditure for this purpose, and suitable buildings are now under way to be in readiness for the summer encampment of the First and Second Brigades. If the State could go a step farther and cook the rations, issuing each day the actual quantities needed upon requisition of the company commander, and deducting the cost from the pay of the men, some additional advantages would be gained. There could be efficient medical inspection of the raw food and also of the cooked ration, and a practical lesson in this most practical duty of a sanitary officer could be given to the medical staff by detailing a medical officer for each day's service in this capacity. This slight amount of experience might be of great benefit in teaching a medical officer how to inspect and select rations intelligently when ordered out on a riot call or other emergency. The militia should be a training school for the medical officer in all branches of his duty, and certainly the health

and efficiency of troops in actual service are dependent as much upon judicious feeding, as upon any other element of sanitation or hygiene.

It has been recommended by some medical officers of the National Guard that the troops in summer encampments should be placed on a strict army ration, both as a form of discipline and to inure them to the absence of luxuries that would be their lot in actual service. This seems to me to be altogether undesirable. In the first place, the army ration of bread, meat and potatoes, is so selected because of its portability, its general adaptation to all climates and seasons, and its ready availability at all times. It cannot be at once the best assortment of food for a hot week in July on the sea coast, and for mid-winter in the Rockies. It may be improved upon, from a hygienic standpoint, in summer encampments, by a reduction of the meat ration, and a substitution of fish, fresh vegetables and fruits. Any change from the customary diet of the men is liable to cause dyspeptic symptoms for a few days at least, so that our militiaman for the brief time of his summer camp would be in a state of transition which would lead to no definite end. Even in time of actual service the comfort and convenience of the men are a prime consideration of the commanding officer, and the most prominent thought in the mind of the soldier himself. As a matter of fact, the army ration is not adhered to in posts and stations where something better can be obtained, as it is well understood that nothing is too good for the soldier—if he can get it. The voluntary endurance of hardship and privation is not conducive to comfort, health and the best results of drill, nor attractive to the volunteer citizen soldier. As far as the health of a camp is concerned, better results can be obtained by a varied diet, carefully selected in reference to the time and place of encampment, and adapted to the needs and habits of the men who constitute the force. This selection should be made under the guidance of a competent medical officer, who, by this experience, is himself trained for similar duties if called into actual service. The State of Massachusetts has adopted an emergency ration, sufficient for one day's subsistence, consisting of pilot bread one pound, cooked meat one pound, coffee three ounces and sugar four ounces. With each company is placed a field cooking apparatus with which the men may learn

to prepare their ration. This will prove serviceable on a one day's tour of duty, but for a week's encampment I think few medical officers would approve such a digestive experiment. If, however, the catering of a summer camp be done through a commissary appointed by the State, and by consultation with a medical officer, the best results from a hygienic standpoint would be reached, and incidentally the cost per man could be reduced probably fifty per cent. to the great advantage of the company treasuries. It is to be hoped that all future dietetic experiments of this nature may be reported at the meetings of this Association, that the medical officers of our National Guard may learn as well as teach.

In conclusion I would emphasize particularly the following points:

1. Sickness in summer camps is due principally to injudicious diet.
2. This could be remedied in great measure by medical inspection of food.
3. Permanent kitchens would secure better cooking.
4. Issuance of cooked rations by the State would render efficient inspection possible.
5. The duty of such inspection would be a practical training for medical officers.
6. The fixed army ration is not applicable to volunteer troops, and never desirable if better rations can be obtained.
7. State catering would reduce the cost to companies fifty per cent.

THE NAVAL MEDICAL OFFICER, AND EXPEDITIONARY BOAT DUTY.

By JOHN C. WISE, M. D.,

Surgeon U. S. Navy.

While it is not probable that boat operations will play as important a part in maritime warfare of the future as they have in the past, the recent troubles in China and Hawaii demonstrated the need of methodical consideration of this subject.

There has been in our past history a singular apathy in providing surgical aid to those engaged in this duty, and this is the more remarkable when we consider how sanguinary these contests have been.

During our Revolutionary War flotillas, offensive and defensive, swarmed the inland waters. In an engagement in the Chesapeake, known as "The Battle of the Barges" (occurring in 1782), by an explosion of an ammunition chest on the Virginian barge "Protector," twenty-nine men, including the officers, were wounded, and an equal number killed; yet there was no surgical aid at hand, and many deaths occurred from hemorrhage. In 1812 there was a semblance of organized Medical and Surgical aid. During the Civil War boat operations, though numerous, were not so disastrous to life as in previous conflicts.

Just what elements of warfare modern improvements will eliminate is uncertain, but at this time, on foreign stations, boat expeditions as patrols, or for the purpose of defending life and property are not uncommon.

The conditions under which boat expeditions are called away are numerous, and with different purposes, requiring different preparations. Often the occasion is fore-known, when the medical officer is notified and instructed; at other times the duty is emergent, and it is then that the benefit of previous consideration is apparent.

When boats are called for "landing where likely to be opposed" the question to the medical officer is largely one of transportation,

and subsequent field duty. This was a common experience in our late troubles at Honolulu, but will not be considered here.

The circumstances where boats are called most likely to concern us, are: "cutting out," "contending with the other armed boats" and "armed and equipped for distant service."

THE BOAT.

The boat assigned for this service is not a matter of regulation, but very general custom has assigned "the Gig," the lightest and swiftest in the outfit, as the "Hospital Boat." While not what would be asked for, she possesses speed, and is least suited to purely militant purposes. The dimensions vary with that of the ship, but she is essentially long and narrow, and is in consequence unstable and contracted.

While a crew of five men and the medical officer is a large one, it should not be reduced, as speed is so desirable. In instances where transportation is necessary, it would be wise to transfer one or more of the crew to replace the wounded rather than start on an expedition short-handed. Besides the medical officer and crew, no supernumary should be carried. The oars should be fitted with trailing lines, so that they can float alongside when not under way, and all space is needed. In many respects "The Gig" is illy adapted to this work, but fortunately all tendencies are making toward a more humane consideration of avoidable suffering in war. As Beyer aptly says, "It is not the expenditure of necessary life we mean to save, it is the waste and unnecessary expenditure of life we wish to prevent." We can hope that one of the advances of our service will be the assignment of a staunch and swift steam cutter to this duty.

THE EQUIPMENT.

When armed boats are called away, the medical officer will muster his crew at the "Hospital Boat" and proceed as rapidly as possible to equip it, and report provided and ready.

The crew should wear the brassard, and carry no arms.

The medical officer will dispense with side arms. In operations where the enemy is not party to the Geneva Convention—as in China—arms are carried for self-defense. The Hospital Boat flies

the Geneva Cross at the bow and the National Ensign at the stern. The equipment other than medical is, 1st, Provisions. Consisting of canned meats, bread in water-proof bag—quantity varying with probable length of the expedition. Fresh water in beakers.

2d. Cooking utensils. Mess kettle, tin pots, spoons and bucket, lantern and matches.

3d. Boat gear. This should be minimized. No spars—a good tent should be substituted for sail—a small tool chest, glasses and signals.

The medical outfit is that from the supply table of the Navy and consists, 1st, Expeditionary and Boat Case, Surgical. That issued in the new supply table is very compact and complete.

2d. Expeditionary and Boat Case, Medical. This has also been revised and perfected, a large assortment being permissible in tablet form. These cases are fitted in leather pouches, having sling strap with buckles and snap hooks.

Medical officers will usually carry some personal equipment—a pocket case, hypodermic syringe, a few rollers and a flask of brandy; an ordinary haversack will carry them conveniently.

All officers with proper sense of responsibility, will never leave the equipment of the Hospital Boat to the coxswain, but personally inspect everything before reporting.

The instructions requires a Medical Box in each boat about which the senior officer of the boat should be informed. In no service is the personal surgical equipments so important as on Expeditionary Boat duty. Every member of such expedition should carry a "wound package," that of Prof. Esmarch, pinned to the inner lining of the coat. This consists of a triangular bandage, two pieces of sublimate gauze, a gauze bandage four inches broad and six feet long. This wrapped in water-proof material makes a package, about 4 inches square and weighing $3\frac{1}{2}$ ounces. The first field dressing used in the English service is better adapted to Naval use, it consists essentially of "Two ounces carbolized tow, a carbolized gauze bandage, a triangular bandage for sling, the whole incased in tin foil wrapper and parchment cover" (Manual for Medical Staff Corps, 1885).

The elastic suspender of Prof. Esmarch, or that ordinarily worn will be of service in great emergencies. Too much stress cannot be laid on instructions in first aid to all liable to be on such duty as we are considering—especially does this apply to the officer of any boat and the crew of the Hospital Boat. Careful instructions until proficiency is attained is most desirable.

CONDITIONS OF SERVICE AND DUTIES.

The position of the Hospital Boat is in rear of the Column or line.

Being in Line.—When the signal is made, "Vessels Right About," the Hospital Boat obeys the order, and lays on its oars until the line has passed, thus the rear position is regained.

Being in Column.—At the signal "Counter-march, Heads of Column, Right About," the Hospital Boat falls out of line until the column has passed, when position in rear is resumed.

All medical officers should be able to read these signals—if not the coxswain will do so.

The Hospital Boat represents the First line of Medical Aid. The base of operations may be the ship, or a "Collecting Station" on shore, and again, in many cases, there may be none, all aid coming from the boat alone.

The emergencies of Naval operations are even greater than those attending military operations on shore. The best way to utilize his facilities the medical officer will find to vary with the situation, and possibly to depend on instructions. If not too distant the ship should be availed of as a base, but in the majority of cases the situation will demand the presence of the medical officer, and not permit of transportation, all service being in the nature of first aid.

Boat contests are usually short and decisive, and the Hospital Boat, to be of most service, must remain at the scene of action. In rare instances it may become necessary to establish a "Collecting Station" on shore, where the tent may be pitched, to which the gravely injured may be transported and cared for.

It is not within the brief scope of this paper to discuss questions of Military Surgery, but reference will be made to some of the resources of paramount value in this connection.

Of hypodermic medication, Surgeon Major Porter justly remarks, that "it has been found to afford such speedy relief, to be so convenient of administration, and so portable that it is now generally used in warfare.

Concerning first dressings probably every surgeon has his favorite method, but all agree as to the great desiderata, simplicity and cleanliness. We have spoken of the personal equipment, and the wound package, which will be found to meet all ordinary requirements.

During the late troubles in Samoa, when the medical supplies of the U. S. S. Alliance had been almost exhausted in the aid rendered the warring factions, an oakum dressing, confined with a bandage made from the leaf of the banana and palm, succeeded well with the natives. It was noticed also in this connection that sea-water was used frequently and freely on recent and chronic wounds, and apparently with good results.

Slighter cases of hemorrhage are readily controlled by compress and bandage. In more serious cases, the field tourniquets of the surgical box are available, and these are also carried in each boat and can be applied by the officer in charge. Deligation of an artery should never be attempted in a boat if it can be avoided; all conditions are unfavorable, and if to these are superadded a rough sea or darkness, it is well nigh impossible.

The resuscitation of the apparently drowned, picked out of the water, and taken into a boat is best conducted after Sylvester's method, and in the following manner: The crew is massed in the bow and stern, two bow oars only being used to keep the boat's head to wind; four oars with blades forward are laid upon the thwarts, covered and kept together by a tarpaulin; on this the patient is placed, with head aft. The medical officer and assistant, to whom he assigns one arm, take position behind head of patient. If a good helmsman keep the boat well up to the wind, thus preventing rolling, this method is quite practicable. For embarking or disembarking

the sick and wounded, the cot of Medical Director Gihon, U. S. Navy, is decidedly the best we have; it has a very decided advantage over the ambulance lift of McDonald, in the fact that the vertical position permits of easy passage of a hatchway, and its motion is more easily controlled.

"THE RED CROSS."

BY LIEUT. COL. LEONARD B. ALMY,
Medical Director Conn. N. G.

It is but a few years ago, less than a generation, since the "Treaty of Geneva" relegated to the dark ages the treatment of wounded men and their necessary attendants as "prisoners of war." The older members of this Association have, many of them, doubtless suffered imprisonment and privations when captured in the discharge of their duties during "the late unpleasantness."

At that time the order detailing a surgeon to remain with the wounded carried with it a very different probable condition of affairs than if the same order were given to-day among any of the civilized, and some of the so-called uncivilized nations of the world. Thanks to that treaty the Medical Officers and men can now do their work upon the battlefield with the satisfaction of knowing that friend and foe alike recognize the fact that to the wearers of the "Red Cross" are given privileges which are accorded to no other body of men on the field, and that no prospect of imprisonment stares them in the face. These rights of the Medical Department on the battlefield are matters of international treaty among thirty-four of the nations of the world, and even the "red crescent," among those who will not wear the cross, claims protection in the same way.

The treaty which gives us this immunity while in discharge of our duty, is phrased as follows:

Articles of the Convention for the Amelioration of the condition of the wounded in armies in the field.—Signed at Geneva on the 22d of August, 1864:

Article I.—Ambulances (field hospitals) and military hospitals shall be acknowledged to be neutral; and, as such, shall be protected

and respected by belligerents so long as any sick or wounded may be therein. Such neutrality shall cease, if the ambulances or hospitals shall be held by a military force.

Article II.—Persons employed in hospitals and ambulances, comprising the staff for superintendence, medical service, administration, transport of the wounded, as well as chaplains, shall participate in the benefit of neutrality while so employed, and so long as there remain any wounded to bring in or to succor.

Article III.—The persons designated in the preceding article may, even after occupation by the enemy, continue to fulfill their duties in the hospital or ambulance which they serve, or may withdraw to join the corps to which they belong. Under such circumstances, when these persons shall cease from these functions, they shall be delivered by the occupying army to the outposts of the enemy. They shall have the special right of sending a representative to the headquarters of their respective armies.

Article IV.—As the equipment of military hospitals remains subject to the laws of war, persons attached to such hospitals can not, in withdrawing, carry away articles which are not their private property. Under the same circumstances an ambulance shall, on the contrary, retain its equipment.

Article V.—Inhabitants of the country who may bring help to the wounded shall be respected and remain free. The generals of the belligerent powers shall make it their care to inform the inhabitants of this appeal addressed to their humanity, and of the neutrality which will be the consequence of it. Any wounded man entertained and taken care of in a house shall be considered as a protection thereto. Any inhabitant who shall have entertained wounded men in his house shall be exempted from the quartering of troops, as well as from the contributions of war which may be imposed.

Article VI.—Wounded or sick soldiers, whatever their nationality, shall be cared for. Commanders-in-chief shall have the power to deliver immediately to the outposts of the enemy soldiers who have been wounded in an engagement, when circumstances permit this to be done, with the consent of both parties. Those who are recognized as incapable of serving, after they are healed, shall be sent back

to their country. The others may also be sent back on condition of not again bearing arms during the continuance of the war. Evacuations, together with the persons under whose direction they take place, shall be protected by an absolute neutrality.

Article VII.—A distinctive and uniform flag shall be adopted for hospitals, ambulances and evacuated places. It must on every occasion be accompanied by the National flag. An arm badge—brassard—shall also be allowed for individuals neutralized, but the delivery of it shall be left to military authority. The flag and the arm badge shall bear a red cross on a white ground.

Article VIII.—The details of the execution of the present convention shall be regulated by the commanders-in-chief of belligerent armies, according to the instructions of their respective Governments, and in conformity with the general principles laid down in this convention.

Article IX.—The high contracting powers have agreed to communicate the present convention to those governments which have not found it convenient to send plenipotentiaries to the International Convention at Geneva, with an invitation to accede thereto; the protocol is for that purpose left open.

Article X.—The present convention shall be ratified and the ratification shall be exchanged at Berne, in four months, or sooner if possible.

In witness hereof, the respective plenipotentiaries have signed the same and have affixed thereto the seal of their arms.

Done at Geneva, the 23d day of August, 1864.

You can see from these, how great are the privileges accorded to the Medical Department in time of war. The only trouble at present is that other officers are in ignorance of the fact. Only two years ago a captain of the Regular Army, detailed as instructor to the Connecticut National Guard, insisted that it was perfectly proper to capture the Ambulance and Hospital Corps of a regiment, if they were in a position liable to capture, and only retired from his position when shown the synopsis of the "Articles of the Geneva Convention," in Smart's Manual, published "with the approval of the Sur-

geon General of the Army." Last year it was necessary for me to make positive rulings for the Connecticut National Guard with reference to the rights of the personnel of the Medical Department, for they had been interfered with in the proper performance of their duties by whom?—the field officer of the day, who, of all men, should have protected them. I would therefore urge the Medical Officers of each State to endeavor to have the officers and men of the other branches of the service instructed as to what the Medical Department is entitled. Remembering my army friend, it would seem that in this respect a little instruction would not hurt our friends of the Regulars.

There is, however, another subject in connection with the "Red Cross," the importance of which I did not realize until my attention was called to it by that noble woman who has done more for the Red Cross than anyone in America—Clara Barton—and that is the danger of the abuse of our insignia by unauthorized persons.

Article VII. says: "An arm badge—brassard—shall also be allowed for individuals neutralized, but the delivery of it shall be left to military authority. The flag and arm badges shall bear a red cross on a white ground."

However, in this as well as some other lands the Red Cross is used as a trade mark and there is no law against its use by anyone except as an infringement of a trade mark. It is bad enough to have a drug firm use our badge upon absorbent cotton and catgut ligatures and our "mark on its medical stores," or for a brand of beef extract to be apparently sanctioned by the red cross, but when it comes to "Red Cross" Cigars and Cigarettes, "Red Cross" Brandy and Whiskey, "Red Cross" Washing Machines, "Red Cross" Playing Cards, "Red Cross" Soap, "Red Cross" Churns, "Red Cross" Dog Collars, etc., it would seem that it were time to stop the use of the the cross as a trade mark. There is no law of the land which prevents a sutler or anyone else from having his wagon painted with a "red cross on a white ground," which might be the trade mark of his wares, and, with that insignia, going where he will. Suppose that one of these hangers-on of the army should load his wagon with articles contraband of war and be caught in the act of carrying sup-

plies to the enemy under the red cross, how long after that would our red cross afford protection to its authorized wearer? If the General commanding should learn of the unauthorized use of the "Red Cross" to the detriment of his command, what would happen? Of course the result to the unauthorized user of our badge would be most unpleasant for him, but we all know that the sword cuts Gordian knots, and that one does not wait to untie or unravel them in time of war. International treaty or no, the "Red Cross" would have no rights or privileges that anyone would be bound to respect. We have difficulty enough now to gain a qualified respect for the Medical Department and its "hypothetical corps," as it was called by an old cavalry captain: and if we do not use every means in our power to protect and preserve our emblem from dishonor, we will lose that which we have only partially gained. We are a growing Association, and are becoming stronger every month. We reach from Maine to California and from Minnesota to Texas, and it would seem as though we might have our rights protected by laws such as are in force in Russia, Austria, Hungary, Switzerland, France, Norway and Sweden, Italy, Spain, Portugal, Belgium, Denmark, Japan and the Congo Free State.

Since beginning to write this paper, a bill protecting the "Red Cross" has passed the House of Representatives unanimously; but it is pigeon-holed in the Senate, and unless something is done, it is liable to be found at the end of the session among "unfinished business." The National Society of the Red Cross has been moving in the matter since 1890, and I would suggest that a memorial from this Association should be forwarded to the Senate, asking for immediate action to be taken, or that a committee be appointed to confer with individual Senators and so induce them to carry the bill through this session, for the vendors of articles bearing the "Red Cross" as a trade mark will be sure to present their side of the case and it behooves us to present ours and make the law stand so that the "Red Cross" may be a sign which will mean what it was intended that it should mean, and that under the folds of its flag will be found only those doing work in the interests of humanity, and hereafter the Red Cross shall not only protect but be protected.

THE PLACE OF PHYSICAL TRAINING IN THE MILITARY SERVICE.

BY CAPTAIN JAMES E. PILCHER,

Medical Department, U. S. Army.

It is an admitted fact that the mortality from disease attains a considerably higher percentage in war than that from wounds. It would seem then that the prevention of disease is the most important function of the medical officer in active campaign. In peace, where the mortality of the battlefield is entirely eliminated from consideration, prophylaxis plays a still more important role. Recognition of the value of careful attention to the suggestions of the medical officer as an important factor in securing the greatest efficiency of a command, has been a matter of slow growth, but it has been progressive. The influence upon a command of the sanitary condition of camps, cuisine and clothing has come to be fully recognized through the active labors of army medical officers until the surgeon is no longer considered a useless encumbrance except when sickness is present, but takes his place as the most important member of the staff.

It is singular that while the medical department has devoted ample attention to the prevention of disease by the removal of threatening conditions, it has almost entirely neglected prophylaxis by increasing the resisting power of the soldier himself. It is true that the line has been equally unmindful of so potential an agent in securing efficiency in the soldier, devoting centuries to the development of the weapons of war, entirely regardless of the development of the men who were to handle them. Latterly, however, a new interest has arisen in the subject, and at some military posts useful work has been done with insufficient appliances. The sentiment of those officers who have given physical training a fair trial is unanimous in favor of its vast utility. Medical officers, however, have given it but little attention, although they alone are qualified to fully understand its value or to supervise its conduct.

The culture of the body, to be correctly accomplished, demands not only sufficient anatomical and physiological knowledge to locate defective parts, but sufficient pathological perceptivity to appreciate the advantages or dangers to be incurred by training these parts. That it is impossible for any but a medical man to comprehend the needs of the body in the matter of training has been recognized by the better class of instructors in physical culture from Ling, the founder of the Swedish system, down to the great teachers of the present day, who have almost invariably qualified as physicians as an essential preliminary to the proper comprehension and application of physical culture.

While physical training may with propriety be called muscle building, it should be understood that the culture of every other constituent of the organism progresses *pari passu* with that of the muscles, to which the chief attention is given. It requires the most accurate notions of the muscular structure to select the individual muscle to which a part owes its weakness or lack of symmetry. The anatomical and physiological knowledge necessary to individualize and educate distinct muscles in such a manner as to produce symmetry and correctness of contour and the maximum of strength combined with the greatest facility in its employment, demands special medical training. Any one can run a tape measure about an arm, but it requires not only the information acquired in the dissecting room and the physiological laboratory but the power of discrimination developed by careful and intelligent clinical observation, in order to discover what particular member of a group of muscles is responsible for the lack of power which it is desired to correct. Not only does it require the most correct appreciation of muscular function to understand the particular movement or combination of movements adapted to the development of a defective muscle, but, in order to secure the best results, there must be a familiarity with the secondary and remote effects upon other portions of the system.

The perfect man is a figment of the imagination. No person is known to have existed who was an embodiment of perfect health. A physical examination of the most vigorous would reveal in each some lesion of actual disease, some predisposing weakness, or both.

The object of physical training is to take cognizance of physical deficiencies and correct them by movements adapted to secure growth. Hard labor is far from being an equivalent of physical training. It is true that laboring men acquire great strength in certain groups of muscles, but this gain is overbalanced by losses in others. The plowman has strength in his arms, back and legs, but he loses in his respiratory muscles and the anterior thoracic muscles. The deformities of occupation, due to the excessive use of one portion of the body, to the neglect of others, have a recognized place in orthopedics.

The material obtained by taking the average man is excellently shown in Prince Hohenlohe's description of the men obtained in the recruitment of his own regiment. "The barracks were soon full of figures that would put to shame the most exaggerated cartoons of the comic papers. The awkward fellows, whose neglected carriage made them look like a set of botched-up images, tried hard, but in vain, to stand erect. Ill-made and undeveloped, their uniforms would not fit them and, if altered to fit their present figure, would need to be re-made when they should have been remodded by physical training. So, before teaching them a single movement of the military drill or providing them with uniforms other than their canvas fatigue suits, they were drilled in gymnastic exercises leading progressively and gently from the more easy to the more advanced, until finally they had a reasonable command of themselves."

This picture reminds one somewhat of the appearance of the "candidates" at West Point. These young men have quite generally been subjected, before coming to the Academy, to a physical examination by a competent medical man and by him pronounced physically sound. But they are almost to a man awkward, unsymmetrical and unevenly developed, making an appearance, as they are marched to the mess hall, fully as absurd as the conscripts of Prince Hohenlohe. And they form a particularly instructive contrast with the third class men, who have enjoyed the advantages of a year's drill in physical training.

Methods of recruiting employed by the regular army in times of peace, to a large extent prevent the admission into the military service of men with muscles clearly undeveloped or atrophied by

distinctly marked disease. Still it is not infrequent in my observation that men are enlisted, particularly by the regimental recruiting service, with defects or deficiencies sufficiently pronounced to contribute to their life for the next two or three years an important bearing upon their future health. While actual deformity or disease is a bar to the admission of the recruit, the variation in structure is so great that but a small proportion of recruits is either symmetrical or developed.

In the National Guard, where for evident reasons the physical requirements need not be as severe as in the regular service, the field for physical training is still broader and the results obtainable still more striking. Voluntary service lends to the work of the guardsman an enthusiasm which is an important factor in the attainment of the best results.

Physical training may be divided into two categories:

1. Preparatory training, by which deficiencies are corrected and a proper equilibrium of the system secured.
2. Conservative training, by which a well-balanced state of the system is maintained after having once been obtained.

The preparatory training particularly demands medical supervision. Here the methods of physical diagnosis come into play. Mensuration, inspection and palpation are of particular importance. In many gymnasiums, mensuration is the only diagnostic method employed, but it is evident that it is necessarily insufficient since one group of muscles may be so over-developed as to neutralize, in the measurement of a limb, the effect of the atrophy of another—the girth of a part may be up to the average and yet a very definite defect may be readily detected by experienced inspection and its character appreciated by careful palpation.

As a general rule, weight, height and breadth may be said to be in direct proportion to the strength. But the exceptions to this rule are numerous and pronounced. Weight may be due to an excess of adipose tissue, tending to produce debility rather than strength. Height may be due to excessive length of legs or neck, both elements of weakness. Breadth may exist with flaccid muscles and fatty

deposits, which are incompatible with great physical power. As already suggested, there is usually a lack of harmony in development between the various parts of the body, and in this disproportion may lie the source of marked physical deficiency. The well developed chest and arms are more than likely to be accompanied by spindling legs. The limbs of the left side are, in a large proportion of cases, smaller than those of the right—an asymmetry which extends to numerous other details.

The preliminary facts upon which to base the preparatory training, are of ten varieties: (1) the *weight*; (2) the *height* from the floor of the knees, the pubic arch, the sternum and the vertex of the head, the latter with the body standing and sitting; (3) the *girth* of the head, neck, chest, waist, hips, thighs, knees, calves, insteps, arms, forearms and wrists; (4) the *depth* of the chest and abdomen; (5) the *breadth* of the head, neck, shoulders, waist and hips; (6) the *length* of each side from shoulder to elbow, elbow to tip of middle finger, of the feet and of the body laid horizontally; (7) the *stretch* of the arms; (8) the *capacity* of the lungs; (9) the *strength* of the lungs, back, chest, arms and forearms, and (10) the *development* of the body. The appliances necessary for obtaining these data are a steel tape-measure, a large pair of callipers, several spring dynamometers, a spirometer, a mamometer, a pair of suspended rings and a set of parallel bars.

We are fortunate in having at our disposal at the present day the data based upon a large number of observations already made, by the consolidation of which types of manhood have been obtained. Sargent's observations are perhaps the best known and the most extensive, but in the records of the scientific gymnasiums of the country a vast amount of information can be obtained, particularly pertaining to the dimensions of youth and early adult age.

These data are exactly what is required by the surgeon in the examination preliminary to the Preparatory Training, for recruits are—invariably in time of peace—young men. Accurate examination of the recruit, using the eye, the hand and the accessory instruments already enumerated, will show his deviation from the normal type, from which the exercises necessary to assimilate him to the normal will be a natural deduction. Muscular development depends on

frequency of muscular action. The man with undeveloped calves would be given foot and ankle exercises, and he with a slender forearm would engage in the wrist and finger movements. The flattened chest would be brought out not only by use of the accessory respiratory muscles, but all exercises would, by causing deep and frequent breathing, cultivate the respiratory apparatus. The muscles of the neck and face can each be brought up by individual and combined movements. In connection with the special exercises prescribed for the compensation of deficiencies, the recruit will naturally engage with his comrades in other movements which will at the same time keep up the general physical tone until he shall have attained a sufficiently uniform development to permit his passing into the class of the soldier and engaging only in conservative training.

The time during which the recruit remains in the preparatory class is very variable being dependent upon two factors: (1) the amount of deviation from the normal type, and (2) the readiness with which he responds to treatment. During this period he should be continually under medical supervision, but when he passes into the second class, the personal medical inspection need be far less minute, although it should never be entirely withdrawn, as long as the training is continued.

The soldier now enters upon the Conservative Training, extending to the general field of gymnastics where the exercises are numerous and varied. Every movement of the manual of arms and every evolution in marching have an effect upon the muscular system. But it is an error to presume that these are sufficient for thoroughly maintaining bodily efficiency. Not only are they by themselves insufficient for the maintenance of symmetrical development, but they even tend to the accentuation of asymmetry. The very existence of the "setting-up" drill is an evidence of this fact. But while the expanded "setting-up" drill as now practised, serves excellently to correct the vicious attitudes imposed by certain phases of military duty, it is not competent, unaided, to maintain a high physical tone. Even were the prescribed military drills efficient in maintaining a symmetrical physique, they would soon, by constant repetition, become merely mechanical in their execution, a fact which would

detract vastly from their usefulness. Physical training, in order to retain the interest of its participants, should be the subject of unlimited variation. There are no movements like those of the manual of arms requiring incessant repetition to secure precision in execution. Infinite diversity then may be obtained by the employment of the almost boundless category of muscular action—running, leaping, climbing, swinging, turning, lifting, striking and the like, in various attitudes and with various surroundings, without apparatus and with the great variety of apparatus contributed by modern inventive genius. Athletic sports are also a powerful factor in stimulating interest in physical training and for that reason should be heartily encouraged. The spirit of competition thus introduced into the work is of very considerable advantage, although a tendency, apparent at the present time, to subordinate physical training entirely to a preparation for participation in sporting contests is to be deprecated.

An objection urged against physical training in the Army is that the men do not take interest in it. This would hardly be supposed to be a valid objection to any plan looking to the improvement of the service. And moreover, it is not a valid objection. If there is absence of interest anywhere it is due to some defect in the management of the training. To put up a horizontal bar and a dozen dumbbells and magnificently remark to a garrison: "There is your gymnasium. Use it," is discouraging enough to ruin any project. The untrained man does not know how to use gymnastic apparatus. He may have seen the "Queen of the Air" swinging on a trapeze, but he quickly finds that circus acts are not physical training, and he naturally loses interest in the subject. He would lose interest in just the same way in the choicest book of Arabic that might be put before him. He must be taught how to utilize his opportunities. It is like any game—it must be understood to be enjoyed. And here is where the work of the medical officer comes into play and the instructors in physical training find their functions.

But he will require no instruction to appreciate the benefit of the training. The muscular growth begins at once; the size of the body increases; the circumference of the limbs is greater; the chest is enlarged and the weight is augmented. The influence upon the

system of the enlargement of the chest alone can not be computed; the greater expansion permitted to the lungs, the greater play allowed to the heart, the greater amount of oxygen introduced into the system, the greater excretion of effete matter from the blood, with their secondary effect upon every cell and organism in the body, can not be expressed. The increased girth of the extremities is not the only indication of their added strength, for it does not take into account the firmness and contractile power gained even before the growth began. The quickened sympathy between the brain and the muscles can not be shown by any test. The suppleness, the agility, the self-confidence that have developed, can not be represented by figures. The added keenness of perception, the comfort and satisfaction contributed to existence itself can not be estimated, much less represented.

Physical training then should occupy a two-fold place in the military service:

I. In its Preparatory phase, it should be at the basis of all service (a), to build up to symmetry men whose physique is below the standard; (b) to improve the muscular harmony of all recruits, none of whom are symmetrical at enlistment; (c) to give to the men that ready command over the muscular system that only comes from thorough training, and (d) to contribute that quickness of mental comprehension only to be derived from exercising in response to frequently varied commands.

II. In its Conservative phase, it should still remain at the foundation of all service. It is not enough to bring a soldier up to the maximum of physical serviceability, but he must be kept there. To overcome the retrograde tendency characteristic of all forms of life when stimulated to a higher grade, and no less present in physical development, a certain degree of training must be maintained constantly.

III. In both phases it should receive (a) the active personal support of the medical officer, for by strengthening the weaker portions of the system it will increase the resistance to disease and vastly diminish the sick rate of his command; and (b) his most careful supervision as well, in order to insure the proper direction of the training

and prevent excess in its application, an error in either case being sufficient to preclude a healthful growth.

The results of the scientific application of physical training to the military service will be wide reaching in their beneficial effect.

1. The serviceability of the recruit will be more quickly obtained, not only by insuring the symmetrical growth of his frame, but by the awakening of his muscular activity and the consequent quickening of his mental faculties.

2. The efficiency of the entire army will be increased by the development of the physique of the units composing it.

3. The morality of the army will be elevated by substituting the healthful sports connected with physical culture for the less reputable amusements in which soldiers are sometimes tempted to indulge.

4. The economical administration of the government will be materially assisted, for training the soldier to physical vigor will result in keeping from the pension rolls names of many who would otherwise promptly degenerate into helpless dependents upon the bounty of the State.

5. Not only will it vastly increase the efficiency of the military service, but it will have an extensive influence upon the entire community. As the years roll by, it will present to the commonwealth, upon their discharge from the army, a class of men, by their physical development and mental capacity, qualified to be more than ordinarily useful citizens. By its extension to the military schools, springing up all over the country, it will encourage healthful tendencies and manly inclinations in our youth. Through its adoption by the National Guard—always quick to adopt the best features of the regular service—it will disseminate physical development and intellectual activity throughout the young men of the Nation. In every class of society, in every grade of life, wherever health is understood and length of life desired, its influence may be felt and its effects may be appreciated.

THE RELATION OF THE NATIONAL GUARD SURGEON TO THE MEDICAL PROFESSION AND TO THE COMMUNITY.

BY CAPTAIN T. C. CLARK,

Assistant Surgeon, National Guard, Minnesota.

In approaching this subject for investigation, one is impressed by the general lack of correct information, not only in the community, but in the medical profession itself, as to the aim, object, status and value of the National Guard of the United States as a military organization, and of the duties and possible value of the services of the National Guard Surgeon.

I can perhaps illustrate this by the following occurrence in one of our richest and most populous States. The Surgeon General of this State wrote to one of his surgeons, one of our oldest and most active members, requesting as a personal favor, that he would attend this meeting of our Association and find out what it was.

This may seem like an exaggeration, and that it is not possible that any member of the profession, at least, could be so ignorant of the scope and aims of this Association as this request would indicate; but when we reflect that there are many National Guard Surgeons who know but little more of us than that such an organization exists, it is not to be wondered at that a member of the profession who perhaps has had no intimate relation with the National Guard should know so little of the organization in which we take so much pride and for which we hope so much for its future.

There is a reason for this. The close of the War of the Rebellion, with its attendant loss of life and treasure, found this country so exhausted by the same that the generation which participated can be pardoned if it took but little interest in anything so suggestive of the trying scenes through which it had recently passed.

With the army surgeon of actual service, the representative of that department organized and perfected through the necessities of that awful strife, they were indeed familiar, and every village and city gave testimony of their appreciation of his skill and services by their respect and patronage, while the enfeebled and maimed sur-

vivors depended upon him to aid in securing the necessary evidence to establish their claim upon a generous and grateful government for wounds or sickness received in its defense.

Not so with their idea of the National Guard Surgeon.

Even as in the early days of the new National Guard, the old veteran loved to tell the young and enthusiastic Guardsman of how he used to do it, and of the wide difference between fighting actual battles and drilling in an armory or preparing for the duties of a summer camp, so the medical profession either did not consider the National Guard Surgeon worth considering from a professional standpoint, or looked askance at him, as one attracted more by the bright uniform and attendant pomp and panoply of the dress parade than by any professional interest in his military duties, or idea that his services would be of any value to the profession or to the community.

Even as a generation grew up in Egypt that knew not Joseph, so has there been organized a body of over one hundred thousand men, equipped and trained for the duties pertaining to actual warfare, of whose attainments and proficiency the general public, until quite recently, has had but little comprehension; and for whose physical care and welfare over five hundred surgeons have been provided.

In the enormous material and intellectual advancement which has taken place since the war, the medical profession has had its full share, and in that profession perhaps there has been no greater change than in the status of the medical officer of the Army and of the National Guard.

We learn from papers read at previous meetings of this Association, and from other sources, that the scope of the duties of that officer have been enlarged from the mere attendant upon cases of sickness or the operator upon wounded men, by the additional duties of a sanitary officer and to the field of preventive medicine. From the position of a staff officer, whose right to rank was questioned, and the mere performance of the duties above mentioned, he has come to be considered as one of the chief factors in the object to be attained, i. e., to make the body of men under his charge to be of the greatest possible efficiency as a destructive force.

This he accomplishes by diligent and intelligent care of the soldier in the barracks, on the march, and in the field; by due sanitary precautions in regard to his surroundings, regulation of diet, clothing, inspection of his water supply, and all matters pertaining to keeping him in the best physical condition, as well as by the most advanced, scientific and humane measures taken for his relief when wounded on the field of battle, and which tend, if he is not totally disabled when wounded, to restore him to duty at the earliest moment possible, and with the least impairment possible to the fighting force. In this great advance made in military hygiene, sanitation and surgery, the medical officers of the Army have of course taken a leading part. With their high intellectual qualifications, and with their great opportunities for study and research unhampered by the necessities of the general profession in their daily battle for bread, they have been enabled to bring the Medical Department of the Army to a high state of efficiency.

Following in their footsteps largely in the matter of organization and methods adopted, the National Guard Surgeon has contributed somewhat to the advance made in these matters by the large experience gained in the field of active and general practice.

The high degree of efficiency attained in many of our States, in their Hospital Corps and Ambulance Organizations, the high personal and professional character of their National Guard Surgeons, the value of the services they have rendered and are capable of rendering to the State and to the community, leads me to assume that the National Guard Surgeon is entitled to the recognition of the general profession as one of the factors in the future welfare of the State and in the advancement of the science of military surgery.

As no other one of the learned professions comes in such immediate contact with the great masses of the people, as the medical, and as the National Guard Surgeon is also a member of the general profession, it follows that in his association with his fellow practitioners he can do much to dispel the general ignorance of, or indifference to, National Guard interests before alluded to. He can not only do this, but he can do much to awaken interest in these matters,

in the medical profession, by papers read before medical societies on suitable topics relating to the work being done by this Association, on the subject of gunshot wounds, more of which will occur in the practice of the average general practitioner, possibly, than in the domain of most of the medical officers of the Army in times of peace; on matters relating to sanitary science as applied to a large aggregation of individuals, and in many other ways, which will naturally suggest themselves to him.

The roster of this Association shows the names of many gentlemen, eminent not only in the profession, but in the special domain of military surgery, hygiene, sanitation, transportation of the wounded, and kindred subjects. I may be pardoned if I allude to the great stimulus given to the interest in this subject by the formation of this Association, at the suggestion and largely through the efforts of our honored President. The prestige of his name, together with others of high professional reputation, has done much to attract the attention of the general profession to our Association, and to the position of the National Guard Surgeon. To this I may add also, the changing of the name of the Association so as to include the gentlemen of the Medical Department of the Army, thereby giving us the benefit of their ripe scholarship and their special training as military surgeons.

If, now, through concerted action in the several States, proper legislative action can be secured to establish a Medical Department upon the lines laid down by Major Gottlieb, in the paper read before this Association last year, or at least in accordance with some such plan as the military organization of the several States will permit, then with proper requirements for admission to the corps, the status of the National Guard Surgeon will have been established and he can give a satisfactory reason to his professional brethren for his existence.

One more point: This Association, through its President, having offered the suggestion of establishing a medical school for the training of candidates for admission to the Medical Department of the Army in the technical duties of their positions as Military Surgeons, and the Government having established such a school under

the direction of the present efficient Surgeon General of the Army and the presidency of Col. C. H. Alden, Assistant Surgeon General, I would suggest that, if possible, the privileges of this school be extended to at least one National Guard Surgeon in each State, if so desired, the expense, if necessary, to be borne by the State represented, or by the surgeon attending, if no other way can be provided.

This would result in bringing to the support of this school members of the general profession, ripe in scholarship and rich in practical experience, and a more intimate knowledge and relationship be established between the Military Surgeon and the general profession.

In his relation to the community, the special acquirements of a National Guard Surgeon may be of much value.

1. His high personal and professional standing will be a guarantee to the parent or guardian of intelligent and competent professional care and treatment of the young man entrusted to his care, thereby attracting favorable attention to the Guard and securing desirable recruits for the service.

2. He will be of special value as an executive health officer, especially in times of an epidemic, of cholera, yellow fever, or small-pox, where his military training will be of inestimable value in controlling and directing an excited populace, and taking proper measures for the transportation, isolation and general sanitary supervision of the sick, as well as insuring their proper care.

3. He will make the very highest order of Railway Surgeon, the problems of their respective positions being in many respects quite similar, requiring promptness, fertility of expedient, knowledge of the best means for the transportation of the injured, and first aid to the same.

4. The instructions which he will impart to the members of the Hospital Corps, in first aid to the wounded, will be put in practice by them in the several vocations in which they are employed, the numerous accidents incident to the active industries of civil life often calling for the exercise of some immediate attention to the sick or injured person before competent medical attention can be secured.

I might cite as an illustration of this point the case of a man injured in the pine forests of my State, the past winter. Although he had suffered from a double simple fracture of the right tibia, his leg had been placed in splints and he transported a distance of one hundred miles, twenty-five of which was by team, on an improvised stretcher—these measures for his relief having been taken by a member of our National Guard who had received instruction in first aid to the wounded. The injured man made the journey in comfort and the leg was found to have been as efficiently, if not as elegantly dressed, as though done by a member of the profession.

In these and many other ways the properly trained and equipped National Guard Surgeon can be of great service to the community. In fact he adds another conservative, skilled and trained safeguard to combine with all others of a similar nature, to stem and withstand the demoralizing forces set in motion by an uneducated and undesirable immigration and a too lax observance of that due respect for law and order upon which alone a free Democracy can be established and perpetuated.

THE SELECTION OF SOLDIERS.

BY MAJOR JAMES JOHNSTON,

Surgeon 16th Regiment, N. G., Pa.

This is not a study of measurements and statistics, and is not intended to add anything to nor take anything from the Manual of Physical Examination of Recruits.

It is offered as a suggestion to Surgeons of the National Guard—because men are not so rigidly examined before admission to the Guard as are the soldiers of the Regular Army—of a method by which their skilled knowledge may be made use of in the improvement of the service, and the aim of the physical examination be otherwise attained.

This aim is of course to exclude all but the most desirable types of manhood, and enlist those on whom average loads and average duties may be safely imposed without danger of their breaking down under the strain, or becoming incapacitated by the development of

existing disorders. The results of the labors of the Military Surgeons who have compiled the Manual are admirable, and where these rules are followed in detail, those who are accepted as recruits need only drill and discipline to be first-rate soldiers.

But this drill and discipline, as it is understood in the Regular Army, is something that cannot be had in the National Guard. The drilling may compare with that of the Regulars better than the discipline does, but equality in discipline is likely to be attained sooner than equal thoroughness in recruiting examinations.

This condition of affairs makes it necessary, in order to keep up the efficiency of the Guard, that regimental surgeons depend more on weeding out the poor ones after enlistment. And this, I will venture to say, is not only a substitute means, made necessary by circumstances, but really a more expedient procedure, better suited to citizen soldiers.

Physical examination shows whether a man is normal in development or not, and if the functions of the body can be readily performed. But there are some other matters of importance in a soldier that no amount of physical examination will show.

It is impossible to compare men as athletes by comparing the muscles of their limbs. Neither runners nor boxers nor wrestlers nor wheelmen can be given their positions by any process of physical examination before they have contested. Why? Because there are some other qualities than are open to observation required of a successful athlete. And what is true of an athlete is equally true of a soldier. These qualities are will power, energy and what is known as spirit. These are undoubtedly due to and dependent on physical conditions and are just as much within the surgeon's province as a strabismus or impeded respiration.

Actual trial in the field is the best test of a man's usefulness as a soldier, and the system of summer encampments of the National Guard affords surgeons the opportunity to correct the harm to the service that results from loose examinations before enlistment.

Every Guard surgeon knows that in every regiment as in every community there are a certain number who continually reappear

before him, and others who go to camp year after year that are never sick, never get hurt, never want to be excused. He also notices that rainy weather, and extra duties, increase the severity of minor troubles and send in the ailing for excuses in larger numbers. Can anyone doubt that the approach of an enemy would have the same effect. I think it would, and I believe that every observing surgeon can point out men in his regiment who would never be brought face to face with an enemy unless by surprise.

The records of the late war show that there were a number sick during every engagement. This is probably, to an extent, unavoidable; but if a surgeon can know before that any certain individual is more likely to be among the sick than in the field, is it not his duty to report him for dismissal from the service.

My proposition is to "have a little list," which if well kept from one camp to another will tell its own story. It will not be necessary to argue or even urge the discharge of men who can be clearly shown to be unfit for duty. Neither will it be necessary to quarrel with line officers over the propriety of retaining men who are marked below average.

Facts will speak for themselves, and the inferences of the surgeon, if correct, may be trusted to tally very closely with the knowledge that the captains will already have obtained from other sources. There may be some captains who will not want to improve the personnel of their companies. There are some commanders who can not get into a comfortable strut before their social equals; and there are some captains who can not enlist the young men they would choose because their own reputation is not of the best.

These captains are growing fewer, but the Guard will not be right till they are gone out of it.

But the list may grow and be valuable whether immediate attention is paid to it or not. The surgeon's attention may be well taken up in the beginning by making sure that he is accurate in his ratings.

I suppose there are few doctors who ever studied men to classify them according to their dispositions for this purpose. I have not found anything written on this subject, and believe that for most of

us the question how to recognize tail-enders would be a new study in prognosis.

It is the purpose of this paper to suggest that such a study be made, rather than to offer the results of discoveries by the writer. But a few of the most important lessons from my own observations I will give, as an illustration and starting point for your consideration and discussion.

The only military experience, except at summer encampment, that the writer ever had, was on the field of Homestead, where he had an illustration of the monotonous side of a soldier's life by being retained there for over three months.

An experience more nearly approaching a military campaign was had during two seasons with an exploration-survey party in the north of Canada. The experience gained in this work was of particular interest not only because it was of an unusual kind, but because it afforded an opportunity to study men under circumstances of prolonged and excessive fatigue.

Surveying in that country is extremely arduous work. Progression is entirely by canoes or on foot. All provisions and other things going to make up the baggage of the party are made up into packs, which are carried by a "Tump line," Indian fashion, from the forehead.

The peculiarities of the discipline of a survey party is one of the first things to impress a man from the front on his maiden trip. For instance, there is no accurate distribution of loads, each man puts into his pack as large a portion as he feels able to carry; and a spirit of fellowship and emulation governs the whole party. From the first day to the last there is no display of arbitrary authority by the chief, there is no need of it. If anyone should be guilty of shirking, or wasting or damaging property, or other fault against the welfare of all, he is promptly punished by the censure, if not by the kicks, of his companions; while those who are able to do the most and the best work find their recompense in getting it done and winning the plaudits of the others.

The chief of the party selects his men very carefully before starting, and his best guide in choosing is the record made by those who offer their services, in their work on similar previous expeditions.

The wages offered are high enough to be an inducement to the best men obtainable; no man is too high-priced if he is worth it. If an ordinary man's pay is \$25 per month, and a man can be had who is able to do two men's work his services would easily be worth eighty dollars, because he would save one man's rations, and board is worth more than wages on a survey.

A surveyor selects his men much more carefully than a captain does for a campaign; no accomplishment counts for so much as a good record. A man may be a champion rifle shot, or a winner in canoe races, he may be able to sink his axe to the eye in a dry pine or carry the biggest kind of a pack, but if he is not also willing to plod day after day he is not wanted.

A man who creates dissension or dissatisfaction among others is not wanted under any circumstances; but a man is not always barred because he is a kicker; some of the best men I ever saw were cranks of the first water and incessant kickers, but as long as they did not stop their work to kick, but always went ahead in spite of their grumbling, and kept fully abreast with their companions, they were not only desirable but popular.

The work is of such a kind that it can only be done by men of spirit; the only easy part of it is canoeing on long stretches; whenever frequent portages are necessary the unloading, carrying and reloading becomes very tiresome. It is harder yet to pack heavy loads across country; the fastest men soon take the lead and the slowest are always hard set to keep up.

The country is generally broken and rocky, the surface strewn with pines that have fallen in forest fires, and is covered with dense underbrush. One cannot lose sight of the column without misgivings as to being able to follow it. If a man can spring from rock to rock, and from log to log, he can make good time. But if he has the spring fever, which takes all the spring out of him, if he has to get down into the holes that those in front of him jumped over, and climb painfully out again, or if he can not jump without being overbalanced by his load, or if he can not use a fallen tree for a bridge, but makes the party wait while he goes down into a gully and gets up

again, then in these cases he has a very unhappy time of it. An ordinary load for a man is 100 pounds; a novice, if he is a good one, can take this much after he has broken in the muscles of his neck to their unusual task. A good old hand will take four hundred at a load or six hundred over an easy portage.

Now, how do these men take care of themselves?

In the first place they drink no whiskey. That is, I mean to say, not while on the survey. They are not as a rule abstainers when at home. But they do not want whiskey when at work because they say they are not at their best when they drink it. They know this by experience. If any have been drinking before starting the results of it are very evident in the first days of the work. They make no excuses for a drink after they once begin; they prove their good faith and intelligence by never wanting to tap the medicine case until the summer is ended and the homeward journey begun.

If they had less laborious work to do they would surely make every wetting an excuse for a drink, and would be afraid of the germs in the swamp water unless they were killed with whiskey. But the dread of lagging behind, the fear of "that tired feeling," banishes the temptation even if opportunities were offered.

Instead of whiskey, Canadian surveyors drink tea. Not to defraud themselves with a weak imitation of a strong drink, nor as a flavor for hot water, but an infusion of surprising strength in taste and powerful in its after effects.

The men clamor for it that way. Their requisition on the cook always calls for tea strong enough to float a four pound axe, and the amount drunk averages a pint for each man. It is taken this way especially at dinner, and nothing but first quality of tea will be satisfactory. You will easily believe that when a party is turned out into the wet woods at earliest daylight, and travels till high noon on a hot day, that the men would be more inclined to remain lying down in the shade after dinner than to get under their packs and go ahead again. The afternoon's progress is likely to be very little. But Canadian surveyors make the same use of tea that Peruvian cattle raiders do of cocoa. And for my own use and in my practice, as a

result of what I learned on survey, I prefer to use tea. If tea be made very strong so that the bitter or astringent taste is well marked, and drunk very hot without milk or sugar I believe it will be found to be a better restorative than any preparation of cocoa in the market.

After whiskey the most enervating drink is water. A man who drinks water while at work is always a low rate subject.

It is well enough known that one is not inclined to exertion after a big drink of water, but it is not so generally known that men who are deep drinkers of water have little endurance. Voyageurs follow the habits of forest animals by drinking deeply only at night. During the day they carry pebbles in their mouths to keep their tongues moist with saliva.

A man's habit in eating gives perhaps the next most important key to his physical character. It is the writer's experience that men of unusual physical ability and great powers of endurance are moderate eaters and are inclined to be dainty at their meals. There are many giants in strength who are ravenous eaters, but I never saw a man who stuffed himself at table who was a really good and persistent worker; such men moreover give out quickly when put on short allowance. They are totally unable to endure privations, and always give tongue to their complaints in a way that is discouraging to their companions.

In the matter of sleeping it is harder to make a rule; but the best men when young are apt to be very sound sleepers, becoming more and more easily aroused as they grow older.

I have not been able to learn that any military distinction has ever been made between sound and light sleepers, and yet this is a physiological classification that would seem to be important in many ways.

If a regiment of experienced Voyageurs were enlisted for a campaign we would expect that it would be able to distance all the other regiments in the field. It undoubtedly would, and the reason would be not altogether because the men were more accustomed to traveling, but because it would have only really first-class men in its ranks.

The recruits would be the result of a process of selection much better than that prescribed in the military surgeons' Manual. But it does not require much time for an athletic school-boy to become as expert as a backwoodsman. There is no sort of preparation for campaigning that is better than the usual course of college games. Equal development of all the muscles, quick responsiveness to the will and accurate co-ordination of the movements are not so often found as a result of work as a result of play, and a season with a foot-ball team is a better drill in single and concerted movement than any ordinary course in company practice.

There are in every State thousands of young men of perfect physique, who at some time in their youth devote themselves to physical training. They work methodically, and diet themselves conscientiously in the most scientific way they know of. They refrain from over-indulgence, if they do not abstain altogether, from whiskey, beer and tobacco. They are men who can be relied upon to make a good record each one for himself, as a soldier in the National Guard, for the pride and satisfaction they will have in after years of other business.

In the matter of courage the characteristics of our countrymen compare favorably with those of other nations. Americans are not usually burning with a desire to offer up their lives for their country like the French heroes, nor do they follow the British in cultivating a purpose to stand their ground against all odds. They are imbued with a more practical idea that the best thing they can do with their lives for their country's sake is to keep them and not give them up if they can help it. They are eager to let the other fellows do the dying; they measure their usefulness to their country rather by causing the mortality than by sharing it.

There is also enough appreciation of Indian tactics in our soldiers to enable them to retire speedily from a bad position without becoming disorganized or giving up the fight.

We applaud practical sense more than sentiment, and one may count upon this in an American army, whether trained or not, whether Regulars or Guardsmen. Courage then can hardly come

into the case, in pronouncing upon the fitness of a man to be a soldier. Whether he be examined according to the manual or whether he be tested by annual encampments, he must be accepted or rejected by other tests, and if accepted his courage must be taken on trust.

General Wolseley says that the best soldiers are fanatics. This is certainly not an experience that we can be guided by. Our best guarantee for the efficiency of our Guardsmen will be in their intelligence, and the best policy of each State government will be to get the very best of samples of American manhood, physically, mentally and morally, in its Guard.

My old schoolmaster used to say that 10,000 perfectly disciplined soldiers could defeat the biggest army ever collected. I never doubted anything my old schoolmaster used to say, but I have thought that 10,000 of the best class of American Guardsmen could give as good an account of themselves as some other soldiers who might be better disciplined.

EASY METHODS OF CARRYING OUT THE PRINCIPLES OF ASEPTIC SURGERY.

By ROBERT REYBURN, A. M., M. D.

Late Surgeon and Brevet Lieutenant Colonel, U. S. Vols.

Nothing is more satisfactory to a surgeon of our day, in the daily round of his professional duties, than the performance of an aseptic surgical operation at one of the hospitals of our large cities. There he has trained medical assistants and nurses at his command, with an ample supply of sterilized surgical instruments and appliances, that fulfill all the requirements of the most exacting surgeon. He can leave his patient after the operation is over without a care or anxiety, knowing that every emergency will be met, and that his patient will be just as well cared for during his absence as if he were present.

But a little reflection must convince every thinking mind that if all this retinue of attendants, and wealth of surgical appliances, is necessary for the proper performance of aseptic surgical operations,

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then aseptic surgery is and must be for the great mass of the surgical operators of our vast country merely a theoretical abstraction and a failure as regards any practical utility to the surgeon. It should be remembered that the great bulk of surgical operations are and must be necessarily performed, far from the hospitals of our great cities, and without the helps and appliances that some seem to consider so essential to success.

Consider for a moment the position of the surgeon to one of the great railroad systems stretching across some of our vast States for hundreds of miles. A collision or other accident takes place in the dead of night—he is summoned to instantly repair to the point where the maimed and wounded require his help. No time has he to summon to his aid trained nurses, nor is he able to bring with him complicated sterilizing apparatus, but he must perforce use such simple appliances as he has at hand and make them answer his purposes.

The military surgeon, after an engagement; the surgeon to a large manufactory; the surgeon on duty in a mining camp, and surgeons, who are engaged all over the United States, are in numberless positions, in which for obvious reasons the finer technique so elaborately insisted upon, and very properly so, in our large hospitals, is entirely impracticable and impossible of execution.

Admitting then for the sake of argument the condition of things above mentioned, the question then arises—is this elaborate technique necessary, and can we not carry out the principles of aseptic surgery in simpler ways with just as good results to our patients?

It is my firm conviction that the elaborate technique so insisted on by some is entirely unnecessary and, heretical as the opinion may seem, that some portions of it are actually injurious to our patients. This remark applies more especially to the use of bichloride of mercury solutions to cut or abraded surfaces of the human body, which in the opinion of the writer of this paper should never be done. The use of bichloride of mercury solutions should be confined to the cleansing of the skin of the patient, over the seat of a surgical operation, and to the cleansing of the hands and arms of the operator.

Recent investigations carried on at Johns Hopkins University (published in the Johns Hopkins Hospital Bulletin of April, 1891,

pp. 50-60), by Dr. A. C. Abbott, on Corrosive Sublimate as a Disinfectant against *Staphylococcus Pyogenes Aureus*, on page 59, at the close of a very elaborate series of investigations on this subject, he says: "It is seen that under the most favorable conditions, a given quantity of corrosive sublimate has the property of rendering inert only a given certain number of individual organisms." Ibid, page 60, he summarizes his results in the following words: "In the light of these experiments and those of the experimenters quoted in this paper, it is plain that for use in surgical practice, the solutions of corrosive sublimate do not possess all the advantages hitherto attributed to them. To the employment of the sublimate solutions upon wounded surfaces it is plain there exist at least two serious objections: First, the albumen of the tissues and fluids of the body tends to diminish the strength of, or indeed renders entirely inert, the solution employed; and second, the integrity of the tissues is materially injured by solutions of this salt."

Investigations made at the University of Michigan (published in the Medical News of October 1 and 8, 1892), have shown that solutions of mercuric chlorid when used as a germicide are often inert, and still oftener actually injurious to the tissues, when applied during surgical operations.

Dr. Chas. T. McClintock gives in the above paper (Medical News, October 8, 1892, p. 399), the following summary of his experiments, viz.:

"1. The high rank heretofore given to corrosive sublimate as a germicide is without warrant and was based on faulty experiments.

"2. The very varying power of resistance in different cultures, as pointed out by Esmarch and insisted on by Gruber, is an all-important factor to be noted in determining the germicidal power of any agent.

"3. That sublimate forms with cellulose, as cloth, filter paper, etc.; with silk, with albuminous bodies, with some part of bacteria (probably the envelope) a chemical compound that can not be removed by any amount of washing with water.

"Thus the sublimate, when acting upon a germ, forms a capsule around it that protects the germ for the time from the further action of the sublimate, and in turn forms an impenetrable barrier to the growth of the organism unless it be removed. This barrier may be removed with salines, and is more rapidly removed in proportion to the renewal of the salines; conditions that are fulfilled in the circulating blood.

"The above named experiments would seem to warrant the expression of the opinion, that the use of solutions of corrosive sublimate in surgical operations should be limited to the cleansing of the surface of the part to be operated upon, and to the disinfection of the hands and arms of the surgeon; and furthermore, that such solutions should never be applied to surfaces denuded of epithelium, or cut surfaces of the body made during surgical operations."

Antiseptic surgery endeavors to destroy the micro-organisms in and around the wound, and thus prevent their development. How futile this effort must be, when we consider that these organisms are everywhere and at all times present with us. They are in every breath we draw, in much of the water and in many of the articles of food that we consume; and indeed, exist always in the alimentary canal and all parts of the body exposed to the air. But on the other hand it must be remembered that there are bacteria and bacteria. There are some species of bacteria which, when planted in a wound, will bring forth as the result of the poisonous materials formed by them the formation of pus with the resulting septic fever, as certainly as the acorn when planted and nourished will develop into the sturdy oak. There are some other species which, when they come in contact with a wound, are practically harmless. Of course we can not with the naked eye distinguish between the poisonous bacteria and the harmless ones, and hence our only safe plan is to so far as possible exclude them altogether from wounds, whether made by violence or those made during surgical operations. How, then, can this be done? The first point to be observed is, to use as little water or watery antiseptic solutions as possible in contact with the wounds made during surgical operations. The reason for this course is that by so doing we remove one of the essential conditions necessary for

the development of bacteria, and thus prevent or at least hinder their growth. It is practically impossible to diminish or prevent the growth of bacteria in a wound, by either raising or lowering the temperature of the wounded parts; hence we can only endeavor to accomplish this object by making use of the other two methods of limiting bacterial growth, viz.: to keep all wounded surfaces as dry as possible, and to exclude them from the action of the atmospheric poisonous germs during the process of repair.

Simple and self-obvious as these principles of treatment may appear to be, yet they are largely neglected and ignored by very many surgical operators at this very time. Often during operations performed by the most eminent surgeons (let us say an amputation) we see the field of operation deluged with a solution of boric acid, a solution of carbolic acid, or worse still, a solution of mercuric chloride. This seems to me to be radically wrong in practice and entirely inconsistent with the elementary principles of aseptic surgery. Of course, in operations which require the opening or removal of large suppurating cysts or cavities, it is necessary to wash them out. This should be done, we believe, with fluids as near the composition of blood serum as possible.

That wonderful operator, Lawson Tait of Birmingham, England, who has nearly completed his third thousand of operations upon the abdominal cavity, uses no fluid to wash out the abdominal cavity during his operations, excepting recently boiled water.

For use in surgical operations the following fluids only are necessary, viz.: recently boiled water used tepid (about the temperature of 100 F.) and normal salt solution (0.75 per 1000 easily made by dissolving one ounce, avordupois, of common salt in a gallon of boiling water).

Aseptic surgery, therefore, is after all nothing but cleanliness, but when we say that, we mean cleanliness carried to a microscopic degree of perfection, and far surpassing the ordinary ablutions by soap and water. What we endeavor to do at the present time, before any surgical operation, is to so thoroughly cleanse the patient, the surgeons, assistants, nurses, surgical appliances and dressings, (of course including the hospital and all its surroundings), so that no

germ of poisonous bacteria can infect the wound, and cause suppurating fever and perhaps the death of the patient operated upon. Modern surgery starts out with the assumption that in an operation aseptically performed upon an aseptic patient, and by an aseptic operator, there should be neither suppuration nor fever following any surgical operation. This is of course the ideal of surgery, which can not always be realized, but nevertheless it is the goal towards which we should aim, and which we should always endeavor to attain. Every instrument and surgical appliance must be sterilized shortly before the operation, either by boiling in water containing 1 per cent of carbonate of soda (commonly called washing soda), half an ounce to three pints of water, or by being exposed to a dry heat above the temperature of boiling water (from 230 to 240 degrees Fah.) for one half hour before the operation.

This can be done in the various patterns of steam and dry sterilizers which are now on the market, and can be procured at a moderate cost. But my principal object in writing this article is to call attention to the fact that aseptic surgery can be practically carried out without the purchase of any apparatus whatever. A tin wash boiler, which can be found in the humblest home, is just as good for sterilizing surgical instruments as Arnold's or other of the steam sterilizers in use now. A still more simple sterilizer for small instruments is the ordinary oblong tin baking pan, so familiar to our eyes in our youthful days. This pan when filled with boiling solution of carbonate of soda, may not look quite so ornamental as a porcelain evaporating dish, or a forty-dollar copper sterilizer, but it will do just as good work. As before mentioned, to the above must be added absolute cleanliness of the operator, assistants, nurses, and in fact of all who come in contact with the patient. It is scarcely necessary here to say that the part operated upon, and the arms of the operator, assistants, and nurses, must be thoroughly scrubbed, first with soap and water, and then with solution of one to 2000 mercuric chlorid, just before the operation. One incidental and very great advantage in operating in private houses, providing they are clean and in good sanitary condition, is that the germs of poisonous bacteria are for obvious reasons not so liable to be found there as in the air of

crowded hospitals. In regard to the sterilization by the dry method, the only thing that is absolutely necessary to be purchased is a good thermometer graduated to a temperature of 300 degrees Fah. Of course it is convenient and perhaps more surgical looking to buy a dry sterilizing apparatus, but it is by no means essential. The oven of a kitchen range or that of an ordinary cooking stove will answer every purpose. Take a common pasteboard box, such as letter envelopes are packed in, place in the bottom of it a layer of aseptic cotton about two inches in thickness, lay on this your instruments and surgical appliances (bandages, etc.), with your thermometer, and your apparatus will then be complete. Place in the oven and expose to a temperature of 230 to 240 degrees Fah. This temperature can be easily regulated by a little practice, and is lower than the temperature required for ordinary baking purposes, which is said to be 270 degrees Fahrenheit.

A surgical operation is to a certain extent the opprobrium of medicine, for in having recourse to it we thereby confess the failure of our science. The ideal surgical operation, therefore, is one that removes the diseased or injured portion of the body with as little disturbance of the normal conditions of the tissues as possible. Repair without inflammation is, as all know, the motto of modern surgery. How preposterously absurd, therefore, is it for us after having removed, let us say, a tumor or limb from the body, to douche the seat of the operation with solutions of mercurial chlorid or other powerful irritant, producing necrosis of the tissues and thus preventing the very end we seek to attain. To Professor Lister we owe the grand idea of excluding the bacteria and other germs from wounds, thus creating the new science of antiseptic surgery. It is perfectly true that aseptic surgery, as now practiced in this country and in Europe, is very different from, and far superior to the cumbrous procedures and dressings devised and practiced by the father of antiseptic surgery. The carbolic spray, once universally applied, has been almost entirely abandoned, and during my recent visit to Europe I never saw it once used. The many layers of protective gauze, mackintosh, etc., are now replaced by a simple layer of iodoform gauze, with an abundant layer of aseptic cotton firmly retained by bandages.

Finally, allow me to add the following maxims: 1. Never use a drainage tube in a wound unless you are absolutely certain you can get union by first intention. 2. If you have an amputation to perform, ligate every vessel requiring it with aseptic catgut, silkworm gut or silk; cut the ligatures off close to the vessels and leave them in the stump, close the flaps with similar sutures, and use no adhesive plasters in contact with the flaps of the stump. After you have stitched up the flaps, dust their surfaces with iodoform, boric acid, or subnitrate of bismuth. Place over this a layer of iodoform gauze, then an abundant layer of aseptic cotton, and over all this two layers at least of a well-fitting bandage. The reason why I do not use adhesive plaster in contact with the flaps of the stump, is that it can not be properly sterilized, and is very often the means of infecting the stump.

Above all things, never open a stump for ten or twelve or even fifteen days after an amputation, if the temperature of the patient is at normal point, or even a degree above. On the other hand, if the temperature goes up to 102 or 103 degrees, open the stump at once, and find out the cause of the trouble.

THE GERMICIDAL VALUE OF TRIKRESOL.

By MAJOR WALTER REED,

Surgeon U. S. Army.

Recently a new competitor has appeared to contest the palm with the older germicides. From pre-bacterial days, when Lister first used carbolic acid for antiseptic purposes, basing his action upon Lemaire's discovery that it would prevent fermentation in fluids capable of undergoing that change, down to the present day, this important derivative of coal tar has commanded a wide employment in surgical and sanitary work.

Until 1881, when, influenced by Koch's experiments, bichloride of mercury was brought so prominently to the attention of the profession, carbolic acid had been almost the surgeon's sole reliance in combatting suppurative processes. Henceforth the field was to be

equally shared by the mercurial salt, or perhaps it would be more correct to say that carbolic acid was to be relegated to a secondary position in antiseptic work.

But as time passed and observations multiplied, objections were raised against both of these agents. I need not occupy your time with mention of their disadvantages and dangers; suffice it to say that out of these, and out of a wider knowledge of bacteriology, grew aseptic surgery. Unfortunately, however, septic processes still occur, and infected wounds still present themselves for treatment, so that we yet have need of a germicide.

Partly owing to the desire for a safer and more efficient antiseptic for general surgical work, and partly to the pecuniary reward that would attach to the manufacture of an agent which would, at the same time, be applicable to sanitary disinfection, strenuous and unceasing efforts were put forth to discover a body that would satisfy both surgeon and sanitarian.

In 1886, Hueppe presented the merits of "Aseptol," a body which had been known to chemists since 1841 as orthophenol-sulphonic acid, $C_6H_4HSO_3OH$, formed when phenol is dissolved in strong sulphuric acid, and appearing as a syrupy, brownish liquid, having the odor of carbolic acid. Its easy solubility in water and non-irritating qualities when brought in contact with the skin, up to 10 per cent solutions, gave it, in this respect, an advantage over carbolic acid. Hueppe's experiments proved that exposure to 10 per cent solution for thirty minutes and upwards sufficed to kill anthrax spores; but as a 5 per cent solution required twenty-four hours to kill staphylococcus aureus, its action could hardly be called satisfactory.

The following year (1887) Creolin was introduced by the manufacturing chemist. This emulsion of tar oil in resin soaps, familiar to all, was carefully investigated by Esmarch, Van Ermengen, Wehl, Henle, and others, and proved to be possessed of decided germicidal power, being in some respects superior to carbolic acid.

Its turbidity when mixed with water, the slipperiness imparted to hands and instruments, together with the inconstancy of the preparation, were obstacles to its use in everyday surgical work.

It is worth noting here that as the result of careful experimentation, Henle made the observation that both Kresol and Phenol dissolve very well in soap solutions, and concluded that the germicidal value of Creolin was due to some body contained in the tar oil, of which it is made, and which body stands very near to Kresol.

In 1889 Lysol, made by combination of tar oil with strong potash soaps, was put forward as an efficient disinfectant, having this advantage over Creolin that, whereas the latter was a solution of soap in tar oil, the former was said to be a solution of tar oil in soap; and having the further advantage that when mixed with water it formed clear solutions.

Engler's and Dieckhoff's investigations show that the real significance of a turbid emulsion being formed in the one case with Creolin, and a clear solution in the other case with Lysol, upon the addition of water, is due to the fact that the tar oil out of which the former is manufactured contains but little phenol and considerable insoluble hydrocarbons, whereas that used in the preparation of Lysol contains much phenol and only a small proportion of such hydrocarbons. Both of these mercantile preparations possess valuable qualities. They have been found suitable for vaginal irrigation, and particularly good for the cleansing of hands and greasy surfaces of the body; but for the reasons mentioned heretofore they have not met the demands of daily operative work.

In the investigation of Creolin a valuable point was brought out; for, inasmuch as this agent contained so little phenol and yet exhibited a high germicidal power (*staphylococcus aureus* being killed in a half minute by a 5 per cent solution), attention was drawn to the insoluble hydrocarbons, the homologues of phenol, contained in the tar oil. I think that to Laplace, of New Orleans, should be given much credit for the work which he did bearing directly upon this matter. Having found that the addition of acetic acid to solution of bicloride of mercury prevented the formation of insoluble albuminates when brought in contact with fluids containing albumen, and thus increased its germicidal action; he next, in 1888, while working in the Hygienic Institute in Berlin, tried the effect of mixing crude carbolic acid and concentrated sulphuric acid, and found

that when mixed in equal parts he had obtained a compound which was easily soluble in water, and which was possessed of remarkable germicidal power. A 4 per cent solution in water killed anthrax spores in forty-eight hours, while a 2 per cent solution brought about the same result in seventy-two hours; whereas a 2 per cent solution of carbolic acid or Creolin was without influence. It seems to me that Laplace here took the first step in the evolution, if I may so express it, of the agent which is to-day attracting so much attention abroad as a germicide.

The following year Frankel published an exhaustive review of Laplace's work. He ascertained that by keeping the ingredients at a reduced temperature while undergoing preparation the germicidal value of the mixture was better preserved. Thus prepared, he found that, whereas a 5 per cent watery solution of pure sulphuric acid required twelve days to destroy the vitality of anthrax spores, and a 5 per cent solution of pure carbolic acid fifty-three days, a 5 per cent aqueous solution of the crude carbolic and sulphuric acids killed these spores in less than twenty-four hours; a 4 per cent solution in two days, and a 2 per cent solution in eighteen days. The apparent discrepancy between Laplace's and Frankel's results, the latter explains by the statement that he used anthrax spores which were possessed of "the highest degree of resistance." He thus confirmed the marked superiority of the above mixture over solutions of pure carbolic acid. Frankel next made a mixture of pure carbolic acid and sulphuric acid, and found that solutions of the mixture thus obtained were much inferior in germicidal action to the mixture of crude carbolic and sulphuric acids. Since this is the case, it would appear that the almost insoluble crude carbolic acid must contain some substance of marked germicidal power which is brought into existence by the addition of sulphuric acid, and is thereby made soluble in water. In order to determine just what this body is, Frankel subjected crude carbolic acid to fractional distillation, and found that the portion distilling over between 185 deg. C. and 205 deg. C. (which constituted one-half of the total distillate) contained the important germicidal body; for if he mixed this part of the distillate with sulphuric acid, the mixture possessed the same great

germicidal value. Now since it is known that the boiling point of the different isomeric Kresols lies between 188 deg. C. and 201 deg. C., it is quite probable that this body is one of the Kresols. I will not detain you further with Frankel's experiment than to say that he proved conclusively that the body evolved and brought into solution by the mixture of crude carbolic acid and sulphuric acid, upon which its most remarkable germicidal value depends, is Kresol.

Careful experiments by others have also demonstrated that the valuable antiseptic properties of Creolin and Lysol are due to the Kresol contained in them, and which is in small quantity brought into solution by the resin and potash soap entering into their composition.

Arising from the important work of Laplace and Frankel, a number of investigations have been carried on in Germany, both by bacteriologists and chemists, and a rich literature has sprung up, attendant upon the study of the higher homologues of carbolic acid. New combinations, such as Solveol and Solutol ("neutral watery solutions of Kresol," as Hueppe designates them), made by bringing Kresol into solution by means of sodium cresotate; Lysolum Purum, a solution of Kresol in potash soap, and, lastly, Saprol made by combining crude carbolic acid with petroleum, and whose virtues depend upon its contained Kresol.

What are the Kresols? They are the next higher homologues of Phenol, and differ from it by having one atom of hydrogen replaced by the methyl-group CH_3 . Thus, if we represent carbolic acid by the formula $\text{C}_6\text{H}_5\text{OH}$, Kresol would be represented by the formula $\text{C}_6\text{H}_4\text{CH}_3\text{OH}$.

There are three of these bodies, known as ortho-, para- and meta-kresol. Orthokresol and parakresol are both crystalline bodies, the former having pale reddish, the latter light yellow crystals. Metakresol is a colorless, thickish fluid, whose boiling point is about 201 deg. C. Since the boiling point of these three Kresols lies very near to each other, viz., orthokresol 188 deg., parakresol 198 deg., metakresol 201 deg., it is a somewhat difficult matter to separate them in a pure state. Heretofore they have been prepared by the action of nitric acid on Toluidin; but recently quite a step forward has been made in their chemical technique, and they are now manu-

factured in a pure state from coal tar, the three being presented together and happily named Trikresol. This is a white liquid, of a creosote-like odor, having a specific gravity of 1.042-1.049, and is soluble in water to the extent of 2.55 per cent, or say 1 part in forty.

Although possessing this limited solubility in water, Gruber's investigations prove that it is no longer necessary to resort to combinations of Kresol with other bodies in order to increase its solubility, since a 1 per cent solution possesses prompt and marked disinfectant qualities. Now what constitutes, for surgical purposes, an efficient germicide? Shall we accept Koch's standard, and demand that it shall be able to destroy the vitality of anthrax spores within a few minutes? Later experiments, more carefully conducted, prove conclusively that not even biclorid of mercury will do this, I, therefore, think that there is much sound sense in Gruber's remark that it is no longer necessary to make the destruction of anthrax spores within a short time the test of the germicidal value of any agent. What we are really meeting in everyday practice are the non-spore-bearing forms of organisms. If a germicide destroys the pyogenic cocci with certainty by means of short contact, this stamps it, for surgeons and gynaecologists, as a good disinfectant.

Gruber's experiments show that 1 per cent aqueous solution of the Kresols kills staphylococcus pyogenes aureus with certainty in half a minute, while $\frac{1}{2}$ per cent solutions destroy the same coccus in 10 to 12 minutes.

My own investigations, begun at the suggestion of Surgeon General Sternberg, are, as yet, unfinished, and have been confined to the germicidal action of Trikresol on staphylococcus pyogenes aureus (generally conceded to be the most resistant of the pus cocci), streptococcus pyogenes, bacillus pyocyanus, and the bacillus diphtheriae. Although its action towards the destruction of the Klebs-Löffler bacillus of diphtheria is prompt and pronounced, since the treatment of this disease does not concern us in our capacity as military surgeons, further reference to this organism will be omitted. The method in testing the agent was that advised by Sternberg, viz., to mix equal parts of a 24-hour old culture of a given organism in sterilized bouillon and of the solution of Trikresol, so as to obtain

the proportion desired. In this method, since neither is in preponderance, both micro-organism and agent have a good opportunity to exhibit their capacity for or against a further continuance of vitality.

At intervals of thirty seconds an oese of the mixture was transferred to 5 c. c. of bouillon, and further development watched for a period of two weeks, the tubes being kept at a temperature of 37 deg. C.

Thus tested, I find that one-half per cent solution of Trikresol requires from eight to twenty minutes' contact to destroy the vitality of staphylococcus aureus, while 1 per cent solution kills the same coccus within thirty seconds. After numerous experiments I have never been able to obtain any growth after this interval of exposure to a 1 per cent solution. One-third per cent does not kill in two hours' exposure; 1-800 restrains the development of this coccus. As regards the streptococcus erysipelatos, I find that one-half per cent solution of Trikresol kills it in thirty seconds; 1-800 restrains its development. Bacillus pyocyanus requires the contact of one-half per cent solution for one minute and a half; 1 per cent kills this bacillus in thirty seconds; 1-800 restrains the development of this organism.

One advantage which the Kresols are said to possess is that the presence of albumen in the fluids to be disinfected does not interfere, to a marked extent, with their germicidal action. This is of very great importance, if true. I find that by mixing equal parts of a culture in blood serum of the pathogenic bacteria above mentioned in a solution of Trikresol, so as to give a 1 per cent solution, when mixed, that while a contact of thirty seconds serves to destroy the green pus bacillus, one minute and a half is required to kill the staphylococci and streptococci.

So that, so far as my own experiments have gone, it appears that 1 per cent aqueous solution of Trikresol is, even in the presence of fluids rich in albumen, sufficient for the prompt and certain destruction of the pathogenic bacteria ordinarily met with by the surgeon.

Although it has been stated by several writers that its poisonous qualities are less than those of carbolic acid, I find that recent experiments by Charteris would seem to show, that as far as guinea pigs are concerned, the difference between the fatal dose of Trikresol and carbolic acid is very slight. While a full-grown animal survives the hypodermic injection of either one of these in 7 minim doses, 10 minims of either agent brings about speedy death. But it must be borne in mind, in comparing the poisonous qualities of carbolic acid and Trikresol, that as 1 per cent solution of the latter accomplishes the same results as 4 per cent or 5 per cent solutions of the former, the danger of poisoning is necessarily reduced four or five fold.

Solutions of Trikresol are always clear, and, as used by me, do not impart that disagreeable feeling of numbness to the fingers, such as carbolic acid gives. Sprayed upon the tongue or fauces 1 per cent solution imparts a slight sensation of burning, which is quickly followed by a sense of slight numbness. One-half per cent solution does not excite any disagreeable sensation in my own case, when applied to mucous membrane of throat or nose.

I have thus tried to place before you briefly the merits of Trikresol. Its virtues have been confirmed by numerous foreign observers, who strongly urge its great importance as a germicide. I do not for one moment lose sight of the fact that the work done in the laboratory must be supplemented and put to the final test by the active surgeon and physician. It is this reason, and because of the prominence now given Kresol abroad, especially in Germany, coupled with the almost entire lack of any reference to it in English medical literature, that has led me to bring it to the attention of this Association. To its marked powers as a germicide, both in watery and albuminous fluids, I invite your earnest attention.

BIBLIOGRAPHY.

Hueppe (F.), Ueber die desinficirenden und antiseptischen Eigenschaften des Aseptol. Berlin. Klinische Wochenschrift, 1886, pp. 609-610.

Von Esmarch (E.), Das Creolin. Centralblatt fuer Bacteriologie und Parasitenkunde. Jena, 1887, v. II., pp. 295, 329.

Laplace (Ernst), Rohe Schwefel-Carbolsaeure als Desinfectionsmittel. Deutsche medizinische Wochenschrift. Leipzig-Berlin, 1888, XIV., p. 121.

Henle (A.), Ueber Creolin und seine wirksamen Bestandtheile. Archiv fuer Hygiene. 1889, v. IX., p. 188.

Frankel (Carl), Die desinficirenden Eigenschaften der Kresole. Ein Beitrag zur Desinfectionsfrage. Zeitschrift fuer Hygiene. 1889, v. VI., pp. 521-3.

Van Ermengem (E.), Recherches experimentales sur la creoline; action antiseptique et germicide. Bulletin de l'Academie Royal de Med. de Belgique, Bruxelles. 1889, 4 ser., III., 60-89.

Weyl (T.), Ueber Creolin. Zeitschrift fuer Hygiene. 1889, VI., 151-161.

Gruber (Max), Ueber Desinfectionsmittel und die Methoden ihre Wirksamkeit zu pruefen. Transactions of the Seventh International Congress of Hygiene and Demography, London. 1891, pp. 255-263.

Hueppe (F.), Ueber Kresole als Desinfectionsmittel. Transactions of the Seventh International Congress of Hygiene, pp. 263-272.

Hammer (H.), Ueber die desinficirende Wirkung der Kresole und die Herstellung neutraler waessriger Kresolloesungen. Archiv fuer Hygiene. 1891, XII., 359-381; 1892, XIV., 116-134.

Engler (C.) und Dieckhoff (E.), Ueber die Theer- oder Seifenloesungen in ihrer Anwendung zur Desinfektion, insbesondere ueber das Lysol. Archiv der Pharmacie. Berlin, 1892, v. 230, p. 561.

Paradies (P.), Ueber Kresole als Desinfectionsmittel mit besonderer beruecksichtigung des Lysols. Vierteljahrsschrift fuer gerichtliche Medizin. Berlin, 1892, 3 F., v. IV., Suppl. Hft., 131-159.

Laser (Hugo), Untersuchungen ueber Saprol, ein neues Desinfectionsmittel fuer Fakalien. Centralblatt fuer Bakteriologie und Parasitenkunde. Jena, 1892, XII., 229-240.

Gruber (Max), Ueber die Loeslichkeit der Kresole in Wasser und ueber die Verwendung ihrer waessrigen Loesungen zur Desinfection. Archiv fuer Hygiene. 1893, XVII., p. 618.

Keppler (F.), Ueber die maas-analytische Bestimmung der Kresole und des meta Xylenoels mit Brom. *Archiv fuer Hygiene*. 1893., XVIII., pp. 51-56.

Gruber (M.), Die Kresole in ihrer Anwendung als Antiseptica. *Internationale klinische Rundschau*. Wien, 1893, VII., p. 787.

Hueppe (F.), Ueber wasserloesliche Kresole in der operativen Medicin und Desinfectionspraxis. *Berlin, Klinische Wochenschrift*. 1893, XXX., pp. 494-8.

Vahle, Ueber den Desinfectionswerth des Raschig'schen Kresols und des von Heyden'schen Solveoels gegenueber der reinen Carbol-saeure. *Hygienische Rundschau*. Berlin, 1893. III., pp. 901-7.

Scheurlen, Ueber "Saprol" und die Saprolirung der Desinfectionsmittel, in *Archiv fuer Hygiene*, 1893. XVIII., pp. 35-50.

Keiler (Arnold), Saprol, ein neues Desinfectionsmittel. *Archiv fuer Hygiene*, 1893. XVIII., pp. 57-79.

Pfuhl (A.), Zur Wirkung des Saprols. *Zeitschrift fuer Hygiene und Infectiouskrankheiten*. 1893, XV., 192-205.

Schaeffer (J.), Pruefung der Desinfectionskraft des Aethylen-diaminkresols. *Zeitschrift fuer Hygiene und Infectiouskrankheiten*. 1894, XVI., 21-231.

Liebreich (O.), Die Darstellung der Kresole (Trikesol) als Desinfectionsmittel fuer chirurgische und hygienische Zwecke. *Therapeutische Monatshefte*. Berlin, 1894, VIII., p. 25.

Charteris (M.), Experimental research on Trikesol. *The Lancet*, London, March 31, 1894, p. 801.

“THE ACTION OF RATTLESNAKE VENOM UPON THE BACTERICIDAL POWER OF THE BLOOD SERUM.”

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An apology would be necessary for introducing a subject of this character, on the present occasion, if it were not that the loss of life from poisonous reptiles has become so great that it calls forth the best effort of not only the military surgeon but medical men generally, to lessen it.

The mortality in India alone reaches the alarming figure of 20,000 persons annually, hence it was not a strange coincidence that it should have fallen to the lot of the British Medical Service, led by Dr., now Sir Joseph, Fayrer, to perform the pioneer work in that part of the globe.

While much has been written upon this subject in general, very little has been said or done in the special line to which this paper relates.

At Prof. Welch's suggestion we conducted a series of experiments in the Pathological Laboratory of the Johns Hopkins University during the spring of 1893, having for their purpose the determination of the action of rattlesnake venom upon the bactericidal power of the blood.

Dr. Welch's attention was directed to the investigation of this subject by Dr. Weir Mitchell. Drs. Mitchell and Reichert demonstrated that the poisonous properties of rattlesnake venom depend upon the presence of proteid substances. These investigators were the first to demonstrate the existence of the so-called toxic albumins.

In their monograph on the subject as well as from previous observations it was apparent that the animals killed by rattlesnake

venom decomposed with great rapidity, indeed with such rapidity that Dr. Formad, who contributed an appendix upon the pathological anatomy of animals dead of rattlesnake venom, believed that there was evidence of the spontaneous generation of bacteria.

Dr. Formad thought it impossible for the bacteria to make their way into the circulation and multiply so quickly. This seemed so improbable to Prof. Welch that he suggested to Dr. Weir Mitchell the importance of having this point worked up. Dr. Mitchell kindly gave us a certain amount of poison. We were, however, fortunate enough to obtain a live rattlesnake of the diamond species, known as the *Crotalus Adamanteus*, from which the fresh venom was obtained and used in preference to the dried poison supplied us.

It will not be out of place to recall briefly that the order Ophidia, of the sub-class Reptilia, is divided into three sub-divisions:

First. The Ophidii Colubriformes, or innocuous snakes.

Second. The Ophidii Colubriformes Venenosi, or poisonous Colubrine snakes.

Third. The Ophidii Viperiformes, or Viperine snakes, poisonous.

To the last sub-division, viperine snakes, belong the Crotilidae or rattlesnakes, called by Mayrer "Pit-Vipers," being distinguished from the Viperidae or Vipers proper, by possessing a pit or depression between the eye and the nostrils in the loreal region; a triangular broad head and thick body of variable length.

The *Crotalus* is distributed widely over the globe and all are terrestrial except in India, where quite a number of genera are arboreal; these however lack all semblance to the horny scales or rings at the tip of the tail, known as the "rattle," except in the species called *Halys*, where the tail terminates in merely a rudimentary horny spine.

It is of interest to note that the Indian Crotolidae are not so venomous as their American congeners, though Asia has a very deadly species known as the *Calloselasma Rhodostoma* resident in Java and Siam; while South America is represented by the well-known *Jararacca* or *Craspedocephalus Braziliensis*. Australia and Africa likewise contain ophidians of this class but they are little known.

The Crotolidae of the United States are represented by ten species and three sub-species, all being equally poisonous, so far as

we now know. Of these the *Adamanteus* has three sub-species, one of them, the *Adamanteus* proper found in this country, extending from North Carolina to Florida; a second the *Atrox*, resident in the Indian Territory and Texas, also throughout that stretch of country extending to Sonora and southern and Lower California; and a third called *Scutulatus*, known only to Arizona.

We had in view in the first place to test the question as to whether the blood of animals killed by rattlesnake poison had lost any of its germicidal power.

We used Dr. Weir Mitchell's noose for securing the snake and with a sterilized saucer thrust into the mouth of the animal, we collected the venom. In this way we had no difficulty in getting from 0.5 to 1 c.c. of nearly clear, slightly straw colored fluid, quite sufficient for our purposes. This was diluted with an equal quantity of sterilized physiological salt solution and 0.25 to 0.5 c.c. of this mixture was inoculated subcutaneously under antiseptic precautions, the dose varying according to the time we wished the animal to live. This was usually from one-half to one hour and a half, though in one or two cases, three hours after the injection.

The injections were in all cases given subcutaneously, some times beneath the skin of the abdomen and at other times in the groin. The lesions differed somewhat according to the site of injection; when made beneath the skin of the abdomen, there were most extensive peritoneal hemorrhages, whereas, when the injections were made in the thigh, these lesions were less extensive, although not absent; here the most striking effect noted, beside the deeply discolored integument surrounding the point of injection, were the underlying hemorrhages into the muscles.

The important lesions were briefly these: Most extensive hemorrhage, with disintegration of tissue and actual necrosis of tissue for a wide distance around the point of inoculation, with ecchymoses in other parts of the body, particularly in the serous membranes. Another point which served our purpose admirably, is that the blood does not coagulate after death or coagulates only feebly and after a long interval. We therefore had no difficulty in collecting a sufficient amount of the fluid blood, and we did so by withdrawing the blood

in less than a minute after the animal breathed its last. We exposed the heart at once, and with sterilized instruments made an incision in the right auricle and with a sterilized pipette we aspirated from the right heart, and then passing the pipette down into the abdominal vena-cava, we secured sometimes as much as seven or eight c.c. of blood. This blood was collected in a sterilized test tube and put in the refrigerator. After twenty-four hours, the red blood corpuscles had settled, sometimes a small, soft dark coagulum had formed, and there was a layer of clear serum.

The usual statement is that the blood does not coagulate. It looks as if it did not coagulate, and as though there was merely a sedimentation. But there is in fact an extremely thin clot, which does not retract from the sides of the test tube. It is an extremely viscid, sticky coagulum, which adheres to the platinum needle inserted into it. We pipetted off after twenty-four hours, the clear serum, usually collecting 0.5 to 1.5 c.c. The organisms which were used to test the germicidal powers of the serum, were the bacillus coli communis and the bacillus anthracis. Prof. Welch selected the bacillus coli communis because that is an organism which is normally present in the intestine and also one with which he had experimented upon with normal serum. He took the bacillus anthracis because that is a classic organism in regard to the action of serum. The results were uniform and striking. As a rule, we made a control experiment with normal serum; thus we killed a healthy rabbit and withdrew the serum in the same way, collected the same quantity and inoculated, at the same time as a parallel control, tubes with the bacteria to be tested. The cultures were twenty-four to forty-eight hour cultures. Our bacillus anthracis was obtained in suspension from the spleen of an animal recently dead of anthrax. We wished to obtain the anthrax bacillus free from spores and thought it better to take it fresh from the animal. Similar results were obtained also with twenty-four hour anthrax cultures grown at room temperature. We made a suspension in salt solution of the organisms and inoculated a known quantity, one to two platinum loops of the suspension, into the serum tube. Then we made roll cultures.

The following tables drawn up by Prof. Welch, represent only a certain number of our experiments and are much abbreviated for the sake of clearness:

BACILLUS ANTHRACIS.
NORMAL SERUM.

No.	No. of Bacilli Inoculated.	After 24 hours.	After one week.
1A	485	0	0
1B	8,512	0	0
1C	210	0	0
2A	5,292	0	0
2B	1,628	0	0

BACILLUS ANTHRACIS.
VENOM SERUM.

No.	No. of Bacilli Inoculated.	After 19 hours.	After 24 hours.
1A	8,512	Countless	
1B	25		3,233
2	68		250,000
3	3,292	Countless	
4	3,292	Countless	
5	3,292	Countless	

BACILLUS COLI COMMUNIS.
NORMAL SERUM.

No.	No. of Bacilli Inoculated.	Immediately.	After 24 hr's	After 48 hr's	After one week.
1A	250,000	236	157	Countless	Countless
1B	175,000	188	30	Countless	Countless
2A	29,161	53	0	0	0
2B	3,150	18	0	0	0
3	9,990	13	38	625	Countless
4	84,947	238	0	0	0

BACILLUS COLI COMMUNIS.
VENOM SERUM.

No.	No. of Bacilli Inoculated.	Immediately.	After 22 hours.
1	800,000	1,077	Countless
2	3,150	6	26,000
3	16,560	32	Countless
4	9,990	35	Countless
5	84,947	284	Countless
6	84,947	231	Countless
7	84,947	182	Countless

With the bacillus coli communis, it will be observed that in the case of normal serum, we inoculated 250,000 bacteria. Immediately afterwards there were 256 colonies. After twenty-four hours only 157 colonies. In other words, there was not only no development, but an actual diminution in the number of bacteria. If the organisms are not all killed at the end of twenty-four hours, the germicidal power ceases and those which remain, multiply. After forty-eight hours, the colonies were countless. In the second experiment, we inoculated 175,000 bacteria, which represented 188 colonies immediately. After twenty-four hours, there were only 30 colonies and in forty-eight hours, they were countless. Taking a smaller number of bacteria, 29,161, there were immediately 53 colonies, after twenty-four hours none, after forty-eight hours none, after one week none. In other words, in twenty-four hours the normal serum had destroyed 29,000 bacteria.

These experiments were uniform in results, and point to one conclusion, that the blood of rabbits killed in one-half to three hours after subcutaneous inoculation with rattlesnake venom, has lost its germicidal power. This is of considerable interest, for it is an indication of a very profound alteration in the blood. This germicidal power of the blood is one of very great significance, on which many of the modern theories of immunity depend.

It is of special interest to ascertain under what conditions the germicidal properties of the normal blood serum are at their highest and in what way these properties affect the composition of the blood.

The principal workers in this field have been Von Fodor, Nuttall, Wassermann, Kitasato, Buchner, Ogata, Hawkin and others. Von Fodor's work had reference to the composition of the blood and was intended to show that arterial has a more destructive action on bacteria than venous blood, and also that fresh blood has a more destructive action than that which has been standing for some time. It was also found that the germicidal power of the blood was weakened in an atmosphere of oxygen or carbonic acid gas, but the removal of gases from the blood had no appreciable effect.

A series of experiments showing the effect of moving and stationary blood upon bacteria by means of small globes containing blood, some of which were kept in constant motion and others quite stationary, resulted in no appreciable difference being observed.

Temperature affected very materially the bactericidal power of the blood, which increased with the rise of temperature from 38 degrees to 40 degrees C., and then gradually diminished with the fall.

Von Fodor is of the opinion that the individual predisposition of an animal to an infectious disease stands in close relationship with the germicidal power of its blood. A second series related to the influence of drugs on the power of blood to destroy germs.

Hydrochloric acid had no effect; tartaric acid and quinine respectively, produced a marked decrease. A slight increase was produced by common salt and carbonate of ammonium, but a more marked effect by the phosphate of sodium, while the carbonate of potassium and sodium showed a very remarkable increase. From these experiments the deduction was made that the bactericidal power of the organism was raised by any drug which increased the alkalinity of the blood. The third series verified the conclusions regarding the alkalization of the blood. Of eight rabbits inoculated with anthrax all died, whilst of nineteen which had been previously injected with solution of soda only three died. A majority of the sixteen remaining were perfectly free from disease, only a few being fatally affected.

Up to this time, however, the doctrine of phagocytosis as advanced by Metchnikoff held sway, when Nuttall struck the first severe blow to this theory. He, in his most excellent inaugural dissertation at Gottingen in 1890, showed that the destruction of virulent bacteria in the blood of animals by the leucocytes, was not at all essential, but that the serum of blood free from all cellular elements, possessed this power to a degree equal to the blood in its entirety.

Nuttall's work is graphically described in some twenty-eight tables in his "Beitrage zur Kenntniss der Immunitat." He here proves very conclusively that in the blood bacteria presented

marked evidences of degeneration before being taken up by the wandering cells, or leucocytes. It was also seen that the bactericidal power of the blood of different animals varied, and that while in some certain bacteria were promptly killed, in others these were simply restrained for a time or not affected.

Buchner, Lubarsch, Nissen, Stern and Prudden have practically verified these observations. Buchner, particularly, in his experiments upon dogs and rabbits verified the findings of Nuttall, but went even further and proved that the bactericidal power of the blood in these animals did not at all depend upon the cellular elements, but resided in the clear serum which separated from the clot, after the blood had stood a while in a cool place.

He also demonstrated that the germicidal action of blood and serum were destroyed by exposure for an hour to 55 degrees C., or by heating to 52 degrees C., for six hours, or to 45.6 degrees C. for twenty hours.

Alternate freezing and thawing did not destroy the bactericidal power of serum, but it was diminished or completely checked by dialysis with distilled water, or by extreme dilution with the same. He preserved the anti-bacterial action of the serum by making an equal dilution with a .6 to .7 per cent of sodium chloride solution and was led to believe that the activity of the serum was greater alone than when the cellular elements of the blood were present, hence he concluded that the active element is a living albumin, having as an essential constituent an alkaline base. This albuminoid substance is thought by Hawkin to be identical with his "globulin," isolated from the spleen and lymphatic glands.

According to the views of these experimenters the germicidal power of the blood resides in the serum alone and phagocytosis is but a secondary process, the leucocytes taking up the bacteria only after they had been rendered inert by the germicidal power of the serum of the blood and certain other fluids of the body. For our purpose, however, it is not necessary to insist upon the humoral as opposed to the phagocytic doctrine of immunity. All that concerns us is the recognition of the bactericidal power of the blood serum under certain conditions.

The loss of this normal germicidal power helps us to explain the varying rapidity with which post mortem decomposition sets in. It is well known that persons dead of different diseases decompose with varying degrees of rapidity. We can not explain this differing rapidity of decomposition simply by variations in temperature, for under the same external conditions one body will be decomposed in comparatively few hours and another may remain undecomposed for several days. We selected the animals killed with rattlesnake venom because it is well known that they decompose with great rapidity. The bodies of human beings killed by snake venom are also said to decompose with great rapidity.

The results of our experiments furnish a satisfactory explanation of this phenomenon. The blood at the time of death and even before death, has lost all or nearly all power of resisting the invasion and multiplication of certain bacteria, so that the bacteria of putrefaction which are normally present in the intestine develop with astonishing rapidity and even before the animal is cold produce this wonderfully rapid decomposition. Our experiments are also suggestive as regards certain secondary and mixed infections. The toxic proteids of snake venom belongs to the same class of poisons as those formed by toxic bacteria, such as the bacillus of tetanus, of diphtheria, etc.

It is easy to suppose that these infectious diseases may cause a diminution of the germicidal power of the blood against secondary invaders, of which common examples are the pyogenic bacteria present often in our mouths and intestinal canals, and which in an individual whose resistance is lowered by a loss of the germicidal power of the blood, may grow and multiply. In other words, we can understand better the causation of many of these secondary infections.

CLINICAL REPORT OF PENETRATING WOUNDS OF THE ABDOMEN.

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In presenting several cases of penetrating abdominal wounds, I do not offer any new suggestions, the cases being merely a text for the few remarks and conclusions that follow:

Case I. Patient, male, age 38, occupation bar-tender; admitted to Fitch Hospital suffering from gunshot wound of abdomen, which was inflicted during a street brawl, the victim being at the time in pursuit of the would be assassin.

On questioning the patient, elicited the information that he was at the time recovering from a prolonged debauch, his shaky, excited condition being evidence of that fact. He also acknowledged specific history of several years' standing.

On examination found a ragged wound of entrance, inflicted by a 38-caliber bullet, one inch to the left and two inches above the umbilicus. The indications for an exploratory celiotomy at this time were not marked, inasmuch as the patient presented no evidence of perforation. It was also impossible to detect the course of the bullet, either with probe or sterilized finger, due to the fact that the muscles were contracted at the time of shooting. Nevertheless, following my usual custom in such cases, an eight-inch incision was made in the median line, the internal, or peritoneal perforation then being evident to the introduced finger.

Through this opening, the intestines were carefully withdrawn and examined, with the result of finding an ecchymosed area of the inner surface of the descending colon, and a perforating wound of the jejunum; the points of exit and entrance being about two and one-half inches apart, the surrounding area being smeared with fluid faecal matter. Upon closer inspection of the jejunum, a hard substance was detected in the lumen of the bowel, which proved to

be a piece of the steel hook from the band of the patient's trousers, which had been carried in by the bullet. This accounted for the large, ragged wound of entrance in the abdominal wall and intestines. Large quantities of clotted blood were also encountered, the source of the bleeding being a ruptured large vein in the overlying omentum. The bullet, continuing its course, had lodged in the deep muscles of the back.

In order of repair, the contused colon received first attention; the damage not being sufficient to warrant resection, the area was dusted with sterilized iodoform. The wounds of the jejunum being on the convex border, and the mesenteric border of the gut being unaffected, a typical resection was not attempted, the injured tissue simply being excised, the effect being the straightening out of the gut at this point. By this procedure, the lumen of the bowel was not materially lessened, the edges of the wound being brought in apposition with a Czerny-Cushing suture. The line of suturing was covered with iodoform, and the intestines returned, after carefully sponging out the abdominal cavity. The incision in the belly wall was closed with catgut and silk, and a glass drainage-tube inserted in the hole made by the bullet, and allowed to remain in position for twenty-four hours.

The time consumed in operation was forty-five minutes. The shock attending the injury was quite marked, but the patient reacted promptly, aided by liberal doses of strychnine. Convalescence was devoid of any complication, there being a normal movement of the bowels on the fourth day. Tardy healing at the site of the wound, however, caused considerable annoyance, prolonging the time of stay at the Hospital thirty days.

Case II. Mr. V., age 46, a German, carpenter by occupation. While under the influence of alcohol, stabbed himself fifteen times in the abdomen and chest, using a large-bladed pocket knife, intention being suicide. On examination, some three hours after the occurrence, found superficial wounds of the chest, wrist and throat, five of the abdominal wounds having penetrated the peritoneal cavity; the remainder, ten in number, being merely superficial. These five wounds were located to the left of and in the neighborhood of the

umbilicus. A median, six-inch abdominal incision was made to ascertain the extent of damage done to the contained viscera. The intestines and overlying omentum were carefully examined, there being no extensive lacerations except in the omentum, which was bleeding quite freely, and the intestines in three places simply being pricked.

The salvation of this man existed in the fact that he was endowed with an extraordinary amount of adipose tissue, especially about his abdomen, the depth from the skin to the intestines being about four inches, while the knife blade measured only about four and one-half inches.

The small punctured wounds in the small intestines were closed with the Cushing suture; omental hemorrhage checked by ligatures; the abdominal cavity carefully sponged out and a glass drainage tube inserted through one of the wounds; the abdominal incision closed and the patient put in bed. Considerable oozing occurred for the next twenty-four hours, which gradually ceased, the tube being removed at the end of the thirty-sixth hour. Following the operation, the patient developed delirium tremens, which lasted ten days, there being no other complications.

Length of time in Hospital, twenty-one days.

Case III. Italian, age 32, occupation, laborer. During a free fight, received wound one inch to the right and two inches above the umbilicus, the wound being two inches in length.

On examination found a ragged hole in the abdominal wall which connected with the peritoneal cavity. A median incision was made in the belly wall, the intestines treated as in the preceding cases without finding any evidence of perforation. A portion of the omentum which was lacerated was ligated and removed. The median incision was closed with silk and catgut, and a drainage tube inserted through the stab wound, which tube was removed in twenty-four hours. The patient made a rapid recovery and was discharged from the Hospital on the fifteenth day.

Case IV. Italian, age 28, was stabbed in the abdomen likewise during a street fight.

On examination found an incision two inches to the left and one inch above the umbilicus, this incision being two inches in length, and protruding through it a piece of omentum at least a foot square. The abdomen was opened along the linear semi-lunars of the left side, beginning at the stabbed wound. The omentum was ligated and excised, and the abdominal contents carefully examined without finding any other evidence of injury. A drainage tube was inserted, the wound closed and the patient put in bed. It was necessary to allow the tube to remain in position for forty-eight hours, inasmuch as there was considerable oozing in the abdominal cavity. The patient developed no complication and was able to leave the Hospital in ten days.

To successfully treat abdominal perforations, there are several all important requisites, chief among which are the following:

1st. Asepsis as regards detail.

2d. Thoroughness as regards examination of abdominal contents.

3d. Preservation of the mesentery as far as possible, and consequently the blood supply to the neighboring intestines.

4th. The adoption of such a method of suturing as will preclude the possibility of stricture and leakage.

The significance of the first requirement; i. e., asepsis, is fully appreciated by all who have attempted this form of surgery, notwithstanding the tolerance of the peritoneum to foreign substances.

In regard to the requirement of "thoroughness in the examination of the various viscera," experience is without doubt the best teacher. One realizes this very keenly when upon necropsy, several perforations are exposed which he failed to discover at the time of the operation.

In order to properly examine the abdominal cavity, time is a great necessity as is also systematic inspection and handling when possible.

The examination of the intestines should first of all be attempted, after satisfying one's self that perforation of the peritoneal cavity has occurred. This is best performed by gently withdrawing the small intestines as completely as possible, passing them through the

hands from end to end to an assistant, who receives them in a warm, moist, sterilized towel, after which the large intestines and other organs in the cavity can be gotten at with some degree of success.

The manipulation above referred to must naturally be of the most gentle nature, care being exercised to maintain the necessary degree of heat and moisture of the intestines, thereby preserving the peptonizing and absorbing power of the peritoneum. This is best accomplished by pouring over the intestines from time to time warm sterilized, 3-4 per cent salt solution or simple warm sterilized water, preferably, however, the former, which also tends to lessen the shock of the operation by supplying some artificial heat.

As to the treatment of infected areas of peritoneum, experience has taught me two divisions of cases, the traumatic and pathological, or purulent, the distinction between the two being that the former is amenable to chemical disinfection, while the latter is not; consequently in traumatic cases, thorough mopping of the part, followed by a liberal application of peroxide of hydrogen (15 volume solution), and the liberal application of powdered, sterilized iodoform is sufficient, while in purulent cases, flushing of the abdominal cavity with a weak antiseptic or sterilized salt solution, accompanied by free drainage, seems to offer the best chances for recovery, inasmuch as it tends to restore the absorbing properties of the peritoneum.

An atypical resection of the intestines is oftentimes possible, and if the wound is not inflicted in the mesenteric border and is so situated that the effect will not be sufficient to produce a kink in the affected bowel, this former resection seems to me to be indicated, inasmuch as it does not interfere with the blood supply to the part.

Where a typical resection is to be attempted, we have a choice of many methods; in my opinion, the best of these being Mannsels operation.

It matters not what kind of a resection is attempted, the variety of suturing is very limited, the Czerny-Cushing suture, however, being my choice, inasmuch as it unites the mucous and muscular layers of the intestines and completely brings the serous surfaces in apposition.

The increased knowledge that we have at the present time of peritonitis, and the organisms having a causative influence, together with the germicidal action of blood serum should aid us in selecting for each individual case that method which is best adapted to saving the life of the patient, the brilliancy and speed of execution being an afterthought.

PERNICIOUS FEVER.

BEING CHAPTER VII. OF "A CLINICAL STUDY OF THE FEVERS OF RIO DE JANEIRO, BY DR. JOAS VICENTE TORRES HOMEM, PROFESSOR OF CLINICAL MEDICINE IN THE COLLEGE OF RIO DE JANEIRO, TITULAR MEMBER OF THE IMPERIAL ACADEMY OF MEDICINE, CORRESPONDING MEMBER OF THE ROYAL ACADEMY OF SCIENCE OF LISBON."—RIO DE JANEIRO, 1877.

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§ I.

It is not very easy to say what is understood by the term "Pernicious Fever" in practical medicine. The most celebrated pyretologists are at variance on the question of the real signification of these two words. Many confound the "perniciousness" of a pyretological species with "malignity."

Castan, for instance, says that pernicious fever, or a malignant paroxysm, is a quinine fever characterized by the immediate danger attending it.*

Saint-Vel judges pernicious fever to comprehend all febrile paroxysms which offer an exaggerated intensity of the phenomena of intermittent fever, or are complicated by grave symptoms in the chief organs of the body.†

For Dutroulau, the type and form do not constitute the distinctive characteristics of pernicious fever; its characteristic is the special element of gravity to which has been given the name of "perniciousness." The gravity of pernicious fever appears suddenly

*Castan, *Traité Élémentaire des fièvres*, p. 229.

†Saint Vel, *Traité des maladies des régions intertropicales*, p. 79.

and threatens life at once; it is often fatal in the first paroxysm, and very rarely exceeds the third. It is not only the instantaneousness of the peril which constitutes perniciousness; it is also the kind of the phenomenization, which is referred to one single symptom, or to a group of symptoms, independent of the fever proper, and, so to speak, added on to it. If malignant fever is a dog that bites without barking, pernicious fever is a dog that bites and barks at the same time. Pernicious malarial fever is frequently insidious, that is, may be pernicious and malignant at the same time.*

Pernicious fever, in my way of thinking, is an acute and very grave manifestation of malarial poisoning. As primary, it constitutes the sole disease which attacks the patient, preceded or not preceded by a mild pyrexia; as secondary or consecutive, it is intercalated in the course or at the termination of another morbid entity, and puts the patient's life in immediate peril. When this manifestation of paludism is attended with febrile reaction (pernicious fever properly so called), the type of fever varies, as in simple cases; it is sometimes intermittent, sometimes remittent, sometimes continued. When there is no increase of temperature (paroxysm), the disease assumes the character of masked fever [*Febre larvada*]. In the one case as in the other, the perniciousness may consist either in the exaggeration of any one of the three stages of an intermittent paroxysm, complete and single, or in the appearance of a symptom or a group of symptoms pertaining to an organ or an organic system.

§ II.

In spite of the opinion of Morgagni, who dates the first idea of pernicious fever from Hippocrates, it seems beyond doubt, that Torti was the first physician to describe this pyretological species. He divides the pernicious symptoms into two classes, corresponding to two very distinct states of the animal economy, that of "colliquation," and that of "coagulation."

Grimaud expounds these ideas of Torti, in adapting them to another hypothesis; he considers these same pernicious symptoms

* Dutroulau, *Traité des maladies des Européens dans les pays chauds*, p 121.

as depending, some on a dominant state of "condensation" or "spasm" (coagulation), others on a state of "expansion," or "atony" (colliquation).

Baldinger considers the phenomena by which perniciousness is expressed in fevers, as lesions, more or less profound, of the chief faculties of vital force.

Alibert attributes them to a lesion, more or less profound, of the motor-sensory nervous system.

For Dr. Pidoux, perniciousness exists when, at the same time, one or many special functional disorders manifest themselves, the concomitancy of which is not however, constant or necessary). There is a "rupture of synergies" in the ordinary vital functions, a propensity to "direct vital extinction," an insidious menace of death.

Dr. Bonnet, of Bordeaux, thus expresses himself in regard to the perniciousness of fevers: "The name of pernicious fever is given to intermittent fevers, the intensity of which is so great and the course so rapid that they terminate fatally at the end of some paroxysms, unless means are employed to combat them."*

All these opinions, tainted with the merest vitalism, tend more or less to confound the perniciousness of malarial fevers with malignity, according to the ideas of Barthez. In the one as in the other, there is a direct and profound attack upon the vital essence, a destruction of the radical synergies, an imminent danger of death under deceptive appearances, not in accord with the reality of the peril.

This confusion clearly and evidently appears in the following words of Pidoux:

"Perniciousness depends rather upon the 'pernicious' nature of the disease than on the pernicious disorders which the affection of an organ, whose action is indispensable to the actual perservation of life, may produce in the economy. In certain cases of abnormal and intermittent gouty affections, the organs which suffer, and to which the chief symptoms are referred, are doubtless very important centers of life; yet such paroxysms rarely cause death, as the par-

*Bonnet, de Bordeaux, *Traité des fièvres intermittentes*, p. 51.

oxysms of pernicious malarial remittent fever customarily cause it, even when they affect organs less indispensable to life; such are the stomach in the cardialgic pernicious form, the large intestine in the dysenteric, not to mention the ardent and algid, which attack no organ in particular. It is 'malignity,' that is, the insidious imminence of speedy dissolution, sometimes even in the absence of fatal symptoms, that constitutes perniciousness, and not the intensity of the functional disturbance of this or that particular organ. The danger to the organism is rather in the profound blow to its unity, than in the lesion of structure undergone by this or that tissue."

There are authors who regard the nature of perniciousness very differently, who do not believe in this supreme struggle between life, compromised in its inmost essence, and the morbid cause. Broussais, for example, starting from the assumption that intermittent and remittent fevers, are a periodical gastro-enteritis, says that the pernicious differ from others only by the violence and danger of the congestions.

According to Maillot, pernicious fever is nothing but an irritation having for anatomical characteristic a hyperaemia of the nervous matter and its involucria, that is, of the cerebro-spinal axis.* He thinks, like Broussais, that the pernicious fevers differ from simple intermittents only by the degree of violence of the congestions, or by the importance of the organs upon which these congestions operate.

"I do not believe," says Ritschel, "that perniciousness is a characteristic of intermittent fevers carried to the highest degree. I think it depends on complications foreign to the fever itself, arising at the same time or before it. When we say 'pernicious' or 'sub-continued' fever, the course or termination of the paroxysms is indicated, but not the cause of this course or termination. It would be exact to say an intermittent fever whose paroxysms are multiplied or approximated under the influence of the affection of this or that organ. When the organ is essential to life, when the cessation

*Maillot, *Traité des fièvres ou irritations cerebro-spinalis intermittentes*, p. 326.

of its functions necessarily and properly causes death, the fever is pernicious.”*

Boudin, admitting great differences in the “dose of malarial poison” in the manifestation of the types of intermittent fevers, is inclined to attribute the perniciousness of fevers to the “greater quantity of miasma absorbed.”

At the bedside, and at the autopsy, no physician can embrace any of these theories exclusively. There are cases where the vitalists seem to triumph; others where the victory is on the side of the organicists. The exaggerated localizing ideas of Broussais and his disciples do not deserve at the present day the honor of serious reiteration. To appeal always to a direct and profound attack on the essence of life, to a destruction of the radical synergies of the organism, is to ignore the numerous instances where organic disorders of a material nature, appreciable during life and verified after death, constitute the perniciousness of one or more paroxysms, and which, by their extent as well as by the importance of the organ compromised, carry the patient to the tomb.

Boudin’s opinion fails altogether in practice. How is it that, the circumstances of the poisoning being always the same for all, in some benign paroxysms of intermittent fever occur, of quotidian, tertian or quartan type, etc., and in others a masked fever; in these a bilious remittent fever, in those a pernicious? How explain the different degrees of violence of the disease, so different that here the first pernicious paroxysm is immediately fatal; there, in spite of the lack of suitable medication, a second and a third paroxysm supervene, and only after the latter the patient dies? In the study of a pathological case, we ought always to keep in view the factors which are inseparable: On the one side the morbid cause, on the other the patient, or the ground upon which the former has to exert its action. Now the cause, in the case under consideration, remains always the same, unchangeable; if it seems to vary in intensity in certain circumstances, it is because the ground in which it exercised its strength was more propitious, more favorable to it. We must not forget that

**Compendium*, Tom. V, p. 328.

each physiological individuality carries with its personal aptitudes, a particular method of morbid susceptibility. The human being is gifted with a spontaneity and consequently with a variability of impression, which outside morbigenic causes cannot explain. We ought, then, in cases of pernicious fever, to seek in the conditions of the ground, whose quality is so different, and not in the quantity of the seed, the reason which shall explain to us the gravity of the disease.

§ III.

Pernicious Fever is very frequent at Rio de Janeiro. It assumes numerous and varied forms. Now it presents the frank intermittent type, now the remittent, now the continued. It manifests itself as a primary disease, or supervenes in the course or at the end of another morbid entity, especially of the acute inflammations (pneumonia or pleurisy). In many cases the first pernicious paroxysm is preceded by simple ones, well marked, incomplete, or masked; in others, the patient is attacked by a pernicious paroxysm while in the enjoyment of perfect health. A pernicious paroxysm is not always accompanied by febrile reaction; it sometimes coincides with complete apyrexia, or with diminution of temperature.

It is not rare to observe a paroxysm of pernicious fever in a patient with malarial cachexia, whether at the apogee of intensity of this disease, or at the period of perceptible improvement. In the year 1872 there died in the Santa Izabel ward [of the Misericordia Hospital at Rio de Janeiro], a victim of a sudoral or diaphoretic pernicious paroxysm, a patient who had come from Maxambomba with very advanced cachexia (V. Case xxxvi); in 1875, another cachectic patient, coming from Itaguaí, was attacked by an ardent pernicious paroxysm, which carried him off when he was much better of the cachexia, when everything announced a complete recovery. (Case xxxviii.)

The same etiological conditions which concur in the development of simple fevers, determine the appearance of Pernicious Fever. If many cases of pernicious fever are met with in the great malarial centers, they are observed as well in the heart of the city.

assuming the same forms, characterized in the same manner, attended by equal risks, and demanding from the physician equal promptness and energy in the use of therapeutic means. It is in adult life and infancy, in the male sex, in the hot season, especially after a glowing sun succeeds copious showers, that cases of pernicious fever are most frequently observed in Rio de Janeiro.

§ IV.

In the great majority of cases of pernicious fever, one predominant symptom reveals the presence of perniciousness; this symptom becomes noteworthy not only by its extreme intensity, but by its great variability as well. From this proceed the numerous classifications recorded in science.

There is no disease that presents itself under so different aspects as pernicious fever. It assumes all shapes, conceals itself beneath the most unaccustomed and singular masks, and passes through various metamorphoses, always disguising its true identity from the eyes of the inexperienced physician. There is no organ that may not in its turn become the theater of its travesties; it is not rare to see all the great organic systems compromised at the same time in its violent paroxysms.

From remote eras pyretologists, wishing to furnish the practitioner with the Ariadne's clue to guide him in this interminable maze of varied morbid manifestations, have sought to group in a certain number of categories the varieties which naturally approximate by some common characters. But the multiplicity of new species which have been described since the immortal work of Torti, is a proof of the defectiveness of these classifications.

To demonstrate the impossibility of establishing a methodical classification of the very numerous and varied forms of pernicious fever, it suffices to present the classifications proposed, since Torti, as types of different groups. By these we see that the authors who wished to form distinct categories were forced, every one, in order to remain in accord with their personal observations, to create several new species. These species have been so multiplied since the last

edition of Alibert's book (1820), that they reach to-day a considerable number.

Mercatus admitted six groups of pernicious fever, founded upon the alteration of the humors. Casimir Medicus ("Treatise on periodical diseases without fever"), running through in succession the different parts of the body, notes all the periodical symptoms any one of them may present. Torti, without any doubt, was the first to attempt to establish a precise and methodical classification of the different forms which pernicious fever may assume. He established two great divisions, comprising, one, the forms characterized by the existence of one predominant pernicious symptom, fixing the attention and constituting the whole danger of the disease (*Febres comitatae*); the other, the forms in which this symptom is replaced by a conjunction of grave phenomena, without any single one predominating, the fever tending strongly to be continued (*Febres solitariae*, *Febres subcontinuae malignantes*).

The first group comprises seven distinct species—1st, choleraic, or dysenteric; 2d, atrabiliary hepatic, or hemorrhagic; 3d, cardialgic; 4th, diaphoretic; 5th, syncopal; 6th, algid; 7th, lethargic.

In the second group, which is not subdivided, Torti places the pernicious fevers which give rise to no predominant, well-defined symptom, and which are attended by very varied phenomena.

Alibert, although he had adopted the bases of classification of the celebrated Modenese physician, added ten more species to the seven admitted by the latter in the group of "*comitatae*," as follows: 1st, soporose; 2d, delirious; 3d, peri-pneumonic or pleuritic; 4th, rheumatic; 5th, nephritic; 6th, epileptic; 7th, convulsive; 8th, cephalagic; 9th, dyspnoeic; 10th, hydrophobic.

He also admits and describes the choleraic or dysenteric, the atrabiliary or hepatic, the cardialgic, diaphoretic, syncopal and algid of Torti (16 species), and says in terminating his classification:

"It would have been easy for me to establish yet a multitude of other varieties of ataxic intermittent fever; for example, that variety the paroxysms of which are specially characterized by spitting of blood from the chest; another in which the patient expels blood from the stomach by means of vomiting; another in which he suffers

great pain in the abdomen; another in which the limbs frequently experience twitchings or partial contractions; another characterized by paralysis, appearing only during the paroxysms, etc.; but it suffices to indicate them to the practitioner, who must always be very attentive in his endeavor to discover the innumerable metamorphoses of which these affections are susceptible."

Maillot, in view of the increasing multiplicity of new species, tried to approximate all the morbid individualities by means of anatomical and symptomalogical analogies, and starting from this principle, he established three groups, in accordance with the course of the phenomena,—1st, of the cerebro-spinal system (comatose, delirious, tetanic, epileptic, hydrophobic, cataleptic, convulsive and paralytic forms); 2d, of the thoracic organs (syncopal, cardiac, pneumonic, pleuritic forms); 3d and last, of the abdominal organs (the gastralgie, choleraic, icteric, hepatic, splenic, dysenteric, and peritoneal forms).

Haspel adopts Maillot's classification, but judges it to be incomplete, because it comprises only the cases of pernicious fever with organic lesion, real or apparent. He therefore adds two more forms, the algid and diaphoretic. He does not attach great importance to classifications and expresses himself very positively as regards this:

"We attach to these purely formal distinctions only a secondary value, because they seem to us very artificial and insufficient to embrace all the cases occurring in practice, because ordinarily many of these forms present themselves at the same time or in succession in the same person; because there are pernicious fevers without any predominant symptom, and finally, because nature knows how to vary infinitely its pathological types." (Haspel, "*Maladies de l'Algerie.*")

Haspel indeed is right. What is the real value of these classifications, divisions and sub-divisions? What indication do they furnish for prognosis and treatment? None. The prognosis is dependent on the pernicious nature of the disease, and not on the form it assumes. The treatment should be inspired by the basis and gravity of the affection, and the indications furnished by the

form are secondary. The partisans of classification maintain that it clears up the diagnosis and makes more prominent the therapeutic indications, according to this or that group of symptoms. But the radical differences which separate, as to the secondary indications drawn from the form of disease, two pernicious paroxysms to all appearance with identical manifestations, are a permanent obstacle to the realization of the second desideratum. In reality, to mark out invariable therapeutic rules according to the symptomatic form of a pernicious fever, is to run the risk of advising the same means in two cases apparently alike, but very distinct after being subjected to a vigorous and unprejudiced clinical analysis.

Even as regards diagnosis, the clinging to classifications of the varying forms of pernicious fever has its inconveniences, and at times very grave ones. However numerous, varied, and minute these classifications may be, they will never embrace all the cases which may be met with in practice. Almost every day a new form is made known, not yet recognized and classified. Now, if the physician, not finding in the classification he adopts the new example rising before his notice, forbears recourse to the heroic means which should save his patient, he sacrifices him irremediably with a clear conscience, because he does not recognize the peril surrounding him.

This is why I, excluding none of the classifications latterly admitted, adopt none to the exclusion of others. All are good when the cases observed can be conveniently included in their divisions and subdivisions; but there is not one which is of service in the complex, undefined, unusual cases, and in those marked by a variety of symptoms—and these cases are sometimes seen in Rio de Janeiro.

I have observed in ten years (1866-75) 68 cases of pernicious fever; 31 in the wards of the hospital, 15 in the infirmary of Nossa Senhora da Ajuda, and 22 in private practice.

From the notes and case-papers which serve me as a guide in the study of the present chapter, it appears that the forms as-

sumed by the disease in these cases were the following in order of frequency:—

Algid	11
Comatose	9
Cerebro-meningeal	5
Convulsive	4
Neuralgic	4
Delirious	3
Sudoral	3
Pleuro-pneumonic	3
Ardent	2
Haemoptoic	2
Choleraic	2
Rheumatic	2
Peritoneal	1
Gastralgic	2
Tetanic	1
Epileptic	1
Asthmatic	1
Syncopal	1
Hydrophobic	1
Paralytic	1
Hepatalgic	1
Aphasic	1
Indefinite	6

In the six cases in which the forms of the paroxysms can be referred to none of the divisions recognized in pathology, there was a mixture of symptoms furnished by the various organs or organic systems, which appeared irregularly in the course of the disease.

From the table of statistics here set forth, and which sprung from my own observation, it may be deduced that the algid, comatose and cerebro-meningeal forms are the most frequent in Rio de Janeiro; the first especially predominates the others very sensibly. Consulting in this regard the opinion of several well-known physicians who have an extensive practice in this city, they are unanimous in considering the algid form as the commonest of the forms of pernicious fever observed in practice; they think the same as regards the frequency of the comatose form, and the rank due to it in our statistical charts.

According to my way of thinking, one or many grave symptoms, furnished by an organ or a system of organs, attended or not by febrile reaction, whatever may be the type of fever, may constitute a pernicious paroxysm.

Algidity is a frequent termination of many pernicious attacks, whatever be the form to which they belong.

"The algid state," very justly says Dr. Dutroulau, "appears to be the most legitimate expression of the action of the malarial cause upon the human organism, and is perhaps the pathological center whither converge the other pernicious species: hence it follows that it should appear alone in many cases, and that in others, where it has been disguised, it will reappear as soon as the special symptoms of these fevers have been modified. The truth is that algid fever exists everywhere as a pernicious species, and the algid state is the most frequent complication or termination in fatal cases of pernicious fever, whatever may be their form."

In the opinion of some physicians of the Rio de Janeiro—prominent among them the respected and distinguished Baron de Lavradio—a species of lymphatitis which prevails in this city and is attended by excessively grave ataxic symptoms, constitutes a form of pernicious fever, which they term *lymphatic*.

These practitioners believe that the local phenomena, usually of little severity, as well as the general, almost always very serious, depend on a malarial miasmatic poison, which must be combated energetically and perserveringly by the salts of quinine.

In 1874 a young candidate for a degree defended this opinion with much talent in his inaugural thesis, which is without doubt the best notice we have of this subject.*

For a long time I have been a declared opponent of this view, both in my lectures at the medical school, in some articles written at the request of my pupils and included in their theses, as well as at the bedside. The serious lymphatitis observed here, and which at times appears in little epidemics, is caused either by some one of the local conditions which usually excite inflammation of

*Dr. Carlos Claudio da Silva, "*Das Lymphatites perniciosas que reinam no Rio de Janeiro.*"

the lymphatic vessels, or by a general poisoning of the system produced by the mephitic emanations originating in the great centers of organic matter in a state of putrefaction. Whether in the one case or the other, the entry into the current of circulation of lymph altered in consequence of the inflammation of its containing vessels, produces a change in the blood (lymphæmia) which gives rise to the ataxic symptoms constituting the entire gravity of the disease. When the lymphatitis is caused by mephitism, i. e., when it is the symptomatic expression of phytozæmia, the sulphate of quinine, given at the very beginning, gives good results, as we observe in all pathological cases due to such causes, whether vegetable, animal, or mixed. The patient recovers, the primary poison is neutralized; but if lymphæmia is established, either because the quinine salts were administered too late, or in insufficient doses, or because the lesion of the lymphatic vessels has become general and profound, the quinine medication, far from being of advantage, becomes on the contrary very harmful, because it aggravates the ataxia and favors the appearance of adynamia. In this stage of the disease, tonics, anti-spasmodics and diffusible stimulants are alone of benefit, the only remedies in which the physician should place any confidence. Observation then demonstrates that in the pernicious lymphatitis of Rio de Janeiro, the sulphate of quinine is contra-indicated as soon as the symptoms constituting the perniciousness of the disease appear. In the pernicious fevers it is exactly the reverse. As we shall see farther on, the graver the symptoms indicating perniciousness, of whatever nature they be, the larger should be the doses of the salts of quinia, the more prompt and evident are the triumphs of this medication.

If the lymphatitis in question were a pernicious form of malarial poisoning, it would be frequently observed in the localities where miasmatic affections are epidemic, in the great centers of infection, where the forms of pernicious fever are numerous and varied. Nevertheless, whether in foreign countries where there are epidemics and endemics of malarial affections, or at certain points in the interior of the province of Rio de Janeiro, where sulphate of quinine is an indispensable remedy in the treatment of every disease, malign-

nant lymphatitis, with the characteristics distinguishing it here in the city and making it almost always fatal, is entirely unknown. Can we allow that the lymphatic form of pernicious fever is peculiar to the city of Rio de Janeiro, that it has never manifested itself in other localities, that the most renowned pyretologists have never noticed it, that it does not figure in any of the recognized classifications? Assuredly not.

At the seasons when the grave lymphatitis is observed with us, few cases occur of pernicious fevers, and above all, of simple intermittent. Now to admit a malarial poison, revealing its existence in the lymphatic system, we should be compelled to admit also a special predilection of this poison for certain determined epochs, exactly when it avoids the organs it most commonly attacks, which is an absurdity.

The pernicious fevers, whatever may be the group to which they belong, whatever even may be the species observed, present such a noteworthy diversity, such an unusual lack of harmony between the symptoms which denote them, that to recognize a first paroxysm, in cases where no attacks of simple intermittent fever have preceded, the practitioner must be very sagacious and experienced. In the numerous cases of grave lymphatitis I have observed—terminating fatally, for the most part, after the second or third day of the disease, sometimes later,—nervous ataxic phenomena occur, always the same, which grow worse gradually and progressively until the patient succumbs. The less intense the local symptoms are, the more migratory and erratic the inflammation of the lymphatics, the graver are the general symptoms, the more profound the ataxia of the nervous system. If the local condition were the symptomatic expression of a pernicious attack, would not the phenomena indicative of the perniciousness of the disease be observed from the first day? Certainly they would. Does not the appearance of these phenomena, at a time posterior to the lymphatitis, clearly indicate that they are consecutive to that lymphatitis, that they do not depend upon the same cause that produced it? Without doubt; all the more since no one disputes that traumatism, of whatever nature, provoking inflammation of the

lymphatic vessels, the supervening lymphatitis as well is followed by the gravest symptoms of ataxia, unless terminated by suppuration. These are the reasons which lead me not to admit that the morbid process in question is a pernicious form of malarial poisoning.

§ V.

When a pernicious attack supervenes after a certain number of simple intermittent paroxysms, the latter at times keep getting graver, until true perniciousness appears. Again, the paroxysms, which were complete and regular, become incomplete, anomalous, and insidious. There are cases in which the pernicious paroxysm explodes without any anterior phenomenon indicating it, without the physician being able to foresee it. There are cases in which the malarial poison manifests itself at once by a very grave paroxysm, with no preceding simple attacks; cases in which this first paroxysm is so violent that it kills the patient in a few hours.

Pernicious fever presents no phenomenon worthy of note as regards febrile heat, appreciated by the thermometer. The thermometer does not lend the physician the least assistance in this group of pyrexias; it will hardly indicate, as in benign cases, what the type of fever is.

One of my most remarkable pupils, writing in 1875 his inaugural thesis, on the value of the thermometer in the diagnosis of the fevers which prevail in Rio de Janeiro, recorded in this splendid and conscientious work the fruit of his minute and careful investigations. In spite of his brilliant talents, and the efforts he made to arrive at some positive and satisfactory results, he expresses himself in the following manner:

"While the pernicious pyrexias are those which most demand of the practitioner a prompt diagnosis, for the employment of vigorous and exact treatment, they are also those in which the thermometer possesses least value."*

In the so-called ardent species, admitted by Dutrouleau and

*Dr. Domingos de Almeida Martius Costa. "Do valor dos in vestigações termometricas no diagnostico, prognostico e tratamento das pyrexias que reinâs no Rio de Janeiro," 1875, p. 39.

other practitioners as a distinct form, the excessive elevation of the thermometer (106—107.4—107.8), will serve for the admission of this form, in case of previous diagnosis of malarial fever. This occurred to the hospital patient in 1875, who died of an ardent pernicious paroxysm supervening in the course of malarial cachexia. This patient was much better, and about to leave the hospital, when the interne on duty found him at 8 o'clock in the morning with a temperature of 106.1, although the evening before he was apyretic and doing well. There being no lesion to explain so violent a febrile reaction, the general symptoms which accompany the prodromic fever of the exanthemata not being present, and it being a case of a person coming from Itaguahy with malarial cachexia, the diagnosis of ardent pernicious fever offered no difficulty. At 5 o'clock in the evening the temperature reached 107.3, and at 2 the following morning the patient died. The autopsy demonstrated existence of the visceral lesions produced by malarial poisoning.

§ VI.

In the "algid" pernicious fever, the most frequently observed with us, sometimes a few shiverings occur at the beginning of the attack, sometimes a slight chill, and sometimes the initial stage of the paroxysm is entirely lacking. The symptoms of algidity, in a large number of cases, supervene insidiously. The patient's face grows pale, his features are contracted, cheeks hollowed, his eyes are sunken, his sight deadened, the pupils dilated, the lips become livid, the voice weak, low, tremulous and sepulchral; the skin, especially at the extremities, goes on cooling gradually until it becomes icy. When the algidity has invaded the entire skin, a clammy sweat appears, drenching the patient; and it is in this case that the observer's hand, applied to any part of the algid body, especially to the forehead, nose and upper and lower extremities, experiences a very unpleasant sensation, like that experienced on touching marble or a corpse.

The patient complains of burning heat consuming him inwardly, is very thirsty, and begs urgently for water; the pulse is very concentrated and rapid (125-135 per minute); the axillary temperature,

taken by the thermometer, is 99.5, 101.5, 102.2—rarely 97.8, when the paroxysm is about to terminate fatally. The tongue becomes cold, retracted and a little tremulous; the epigastrium and hypochondria painful, the belly tympanitic, and the urine is suppressed. Respiration, which at the beginning of the paroxysm appears natural, becomes later difficult, oppressive, uneasy, attended with deep sighs. In the midst of all this array of symptoms, when life is ready at any moment to be extinguished, the intelligence preserves its normal integrity; the patient, overcome by sad apprehensions, considers himself lost, bewails his situation, but is not delirious.

If the paroxysm ends fatally, the symptoms I have just described increase, the diaphoresis becomes profuse, the patient's face becomes hippocratic, the heart is enfeebled to such a degree that its beat is hardly perceptible, the pulse becomes thready and extremely rapid, the voice almost extinguished, and life ceases suddenly from cessation of the heart's action.

If the paroxysm is to pass off, even though another supervene, the circulation grows active, heat little by little is distributed regularly over the whole body, the pulse grows stronger and less frequent and contracted, the face becomes more flushed, the look more expressive, the urine reappears abundantly, the belly becomes flaccid and painless, and at the end of a few hours the patient recovers a certain degree of comfort, scarcely interrupted by the sensation of extreme weakness which he feels, and which lasts for many days, even when radical cure is impending. If a second paroxysm is to follow, the prostration in which the patient is left after the first is very marked: His physiognomy then expresses discouragement and terror, the pulse, albeit fuller, stronger and less compressible, yet keeps a certain frequency which inspires suspicion; the tongue is covered with white fur, the liver is congested and painful, and the spleen as well. In one of the cases observed by me in hospital practice, in spite of the flattering condition of the patient after a first algid pernicious paroxysm, an intense pain was noted in the left hypochondrium, without increase of volume of the spleen (*splenalgia*), which led me to presume that another attack would appear. In fact, despite the vigorous treatment employed, my presumption

was changed to reality; the second attack supervened, less grave and threatening than the former, it is true, but attended with one peculiarity that disheartened me. The patient vomited all he swallowed; it was then impossible to give him medicine and other remedies by the stomach. I had recourse to the endermic method, to enemata and to frictions; and, thanks to these means of absorption, succeeded in saving him.

In the "choleraic" and "dysenteric" forms, species of the *algid* genus, the same phenomena of alidity are noted, more or less marked, especially in the former. Besides these phenomena, others appear, identical with those of Asiatic cholera or severe dysentery. In the first instance, together with the choleraic alidity, vomiting and diarrhoea are observed, repeated frequently and abundantly. The matters expelled from the stomach and bowels are riziiform; there is cyanosis; the skin loses its normal elasticity, cramps appear, the face becomes hippocratic, the urine is suppressed, and the unhappy patient is reduced to the state of a moribund in a few hours.

The identity of the symptoms of a pernicious paroxysm of the choleraic form and those of true cholera is oftentimes such that the differential diagnosis between the two diseases will be impossible if we have for basis only the nature and intensity of the symptoms themselves. It is in the previous history of the patient, in the course followed by the morbid phenomena, in the very important circumstance of the absence of a cholera epidemic, and in the state of the liver and spleen, that the physician will find sufficient light to guide him.

In the "dysenteric" form, there is either a pronounced lowering of bodily temperature, or well-marked febrile reaction, which is very common at the outset of the disease. With the cooling of the extremities, or with the febrile heat, coincide the symptoms of a serious dysentery. There are catarrhal, bloody, frothy and fetid evacuations; these evacuations are very frequently repeated, and are preceded and accompanied by violent colic and severe tenesmus. Every time the patient seeks the stool he expels a small amount of fluid, becomes weaker, loses courage, and is often attacked by faintness, vertigo, and even syncope.

In this form, the liver usually becomes much enlarged, and the right hypochondrium grows tense, prominent and painful. The dysenteric form of pernicious fever is very rare at Rio de Janeiro. It appears, from the statistics presented, that in ten years I did not chance to observe a single case.

The "sudoral" form is at times combined with the algid, and only differs from it because the diaphoresis manifested during the paroxysm is so copious that the patient's garments, pillows, blankets, and the mattresses of the bed are completely inundated. There are cases in which the perspiration wets the floor of the room. At other times the profuse perspiration does not coincide with algidity. On the contrary, though the patient sweats excessively, the thermometer indicates increase of heat, and the surface of the body remains hot. The sweat, instead of being cold and clammy, as happens when there is algidity, shares the heat of the skin.

If the patient, in this condition, does not change his linen with due care, if he is not shielded from draughts, the speedy evaporation of the sweat which bathes his skin, depriving the latter of a great amount of heat, which causes a very unpleasant sensation of cold, and may excite a general chill nearly approaching algidity.

Many celebrated pyretologists claim that the algid and sudoral or diaphoretic forms of pernicious fever consist in the exaggeration of the first and third stages of a simple intermittent paroxysm, just as the ardent form is the exaggeration of the second.

CASE I.—[XXX OF THE BOOK.]

Adriano, Portuguese, 32 years old, a mason's servant, living in the Rua de Don Manuel, entered the Santa Isabel ward [in the Mizericordia Hospital at Rio de Janeiro], on the 2d of August, 1868, and occupied bed No. 9. For a week he had daily paroxysms of intermittent fever, characterized by the three stages, and a facial neuralgia, appearing regularly at 1 P. M. and ending at 7 P. M. A purgative of castor oil, taken on the night of 29th July, and some pills, probably of sulphate of quinine, prescribed by an apothecary, were the only curative means adopted by the patient. Having entered at nine o'clock at night, the physician on duty prescribed

one gramme of sulphate of quinine, a mixture of sulphuric ether and tincture of valerian, and sinapisms to the lower extremities.

3d. Present Condition.—Dorsal decubitus, expression disturbed, evincing anxiety and terror, voice weak and wrailed. Algidity very marked in all parts of body except chest, where there is some warmth; in extremities, upper and lower, nose, ears, and chin, greater cooling noted than at other points of skin. Forehead, chest and forearms bathed in fetid and clammy sweat. Pulse small, compressible, 120; respiration uneasy and frequent (28); absence of physical signs on auscultation and percussion of thorax; intense thirst; tongue cool and furred; breath cold; pain in epigastrium and hepatic region; liver a little enlarged, spleen normal; belly retracted; no diarrhoea or vomiting; urine scanty, high-colored and turbid; mind clear.

Prescription:—

Hydrate of canella.....	gr. 180
Bisulphate of quinine.....	gr. 2
Carbonate of ammonia.....	gr. 1
Elixir of paregoric.....	gr. 8
Syr. of gum arabic.....	gr. 30
Essence of peppermint.....	qt. 4

Take two tablespoonfuls every hour.

Two clysters of sulphate of quinine, of 6 decigrammes each.

Sinapisms to upper and lower extremities.

Two broths with rich wine.

At 5 P. M. patient was better; more warmth in extremities; sweating had ceased, face more flushed and pulse fuller. The two clysters had been retained. The patient presented the acoustic symptoms of well-marked cinchonism. He continued to use wine alone, a tablespoonful every two hours, till the following day.

4th. Face more flushed, respiration easier; still coolness of extremities, especially of upper, but much less than day before. Pulse fuller, 112; little thirst; tongue more coated, but temperature normal; less sensitiveness in gastro-hepatic region; liver still enlarged; constipation; urine more abundant, and still with sediment; intense neuralgic pain right side of face.

Prescription:—

Valerianate of quinine.....gr. 2
 Ext. Hyoscyamus.....gr. 0.20
 Ext. Thebaic*.....gr. 0.10
 Soft Ext. Cinchona.....gr. 0.6

Div. in pil. 12.—Take one every two hours, and with each pill two tablespoonfuls of Agua Ingleze.†

A purgative enema, and after its action, 2 enemata of sulphate of quinine, each of gr. 0.6.

Three broths with good wine.

5th. Marked improvement. Perfect distribution of surface warmth; pulse 92 and fuller; appetite. Patient purged largely by purgative enema; retained quinine enemata and had taken 8 pills to hour of visit. Deafness of cinchonism well-marked; neuralgic pain much decreased in intensity; liver less enlarged; urine abundant and normal.

Prescription:—

Four pills of valerianate of quinine.
 Agua de Inglaterra.
 Anodyne liniment to foment right side of face.
 Two broths with wine; half a cup of coffee.

From the 6th the patient was kept wholly on the Agua de Inglaterra; on the 12th he was discharged perfectly cured.

CASE II.—[XXXI OF BOOK.]

Jose Lopes Carvello, Portuguese, aged 19, turner's apprentice, entered bed No. 20 of Santa Isabel ward, on the 13th of July, 1875, affected with a severe bronchitis.

On the 23d, when he was almost cured, and hardly coughed a little in the early morning, he was seized at 6 A. M. with marked chilliness, and at the 9 o'clock visit was found in the following condition:

Great prostration, labored respiration, uneasiness, restlessness, algidity of upper and lower extremities; no perspiration; pulse 110,

*Opium 1 part, distilled water 12 parts, to make soft extract.

†Agua Ingleza, or Agua de Inglaterra, a proprietary remedy, much used in Brazil, is the property of a Portuguese family named Castro, and is a mixture of cinchona bark in the must of grapes, and the compound fermented.

small and contracted; axillary temperature 38.6 [101.5 F.]; tongue cold and thinly coated at base; pain in lower part of left hypochondrium, excited by pressure beneath false ribs; liver and spleen normal; constipation; suppression of urine. No sign on percussion and auscultation of respiratory and circulatory organs.

Prescription:—

One gramme of sulphate of quinine at once; same dose to be given four hours after.

A diffusible stimulant mixture composed of ether, tincture of valerian, canella, and musk.

Sinapisms to upper and lower extremities.

Broth and rich wine.

At 5 P. M. the grave symptoms of the algid attack had disappeared; patient had urinated freely at 3, and the urine contained a little albumen.

On the 24th, at the visiting hour, were observed merely an increased coating of tongue and persistent constipation.

Prescription:—

12 decigrammes of sulphate of quinine in two doses.

Mixture continued, at longer intervals.

A purgative enema of castor oil and the electuary of senna.

Broth, wine, etc.

The doses of quinine were diminished gradually during the following days, and the patient was discharged on the 29th.

CASE III.—[XXXI OF BOOK.]

Luiz Gomes Pereira, Portuguese, aged 28, employee in the brewery of the Ruo da Guarda-Velha, entered Santa Isabel ward on the 9th August, 1874; bed No. 3. He had been attacked by a febrile paroxysm on the 7th in the morning, characterized by intense chill, fever and sweat, with the occurrence at the same time of great pain in the knees, without swelling of these articulations.

He took no remedy, and on the 8th felt well, merely retaining a bitterness in the mouth and loss of appetite. Early on the morning of the 9th, was awakened by a second chill, attended by the same articular pains, by acute pain in the region of the liver, and

by vomiting. At 7 A. M. the physician called to see the patient considered him to be in a very serious condition, and advised him to enter the hospital, where he arrived in a hammock a little before ten o'clock.

Present condition.—Face hippocratic, profound adynamia, complete prostration, voice weak, like that of cholera patients; general alidity, profuse clammy sweat, bathing the whole surface; the hand applied on any part of the body experiences the same sensation as if it touched a wet corpse. Axillary temperature 35.8 [96.5 F.], pulse 132, thready; tongue cold and dry; breath cold; devouring thirst. The patient complains of a burning sensation seated in the epigastrium, and constantly uncovers himself; acute pain in hepatic region; pressure and percussion in this part extort groans from the sufferer; no vomiting nor diarrhoea; the patient only vomited when he had the chill at 4 in the morning; liver a little enlarged, spleen normal; hiccough from time to time; urine suppressed from beginning of paroxysm, bladder entirely empty; respiration frequent, labored, interrupted by deep sighs; pain in the knee-joints, without swelling or reddening of skin, excited especially by passive or active movement of the same.

Prescription:—

Sulphate of quinine.....gm. 2

Valerianate of quinine.....gm. 1

M. Et. div. into three equal doses.

Take one every three hours in a wine-glass of Agua de Inglaterra.

Peppermint water.....gm. 120

Carbonate of ammonia.....gm. 1

Tincture of canella.....gm. 4

Paregoric gm. 8

Ethereal tinct. of phosphorus.....qt., x

Syrup of orange peel.....gm. 30

A tablespoonful every hour.

Sinapisms to the thighs, legs, feet, arms and forearms.

This energetic treatment was regularly followed under the superintendence of eight pupils, who visited the patient hourly in

details of two, until 3 P. M., when death occurred; there not having been time to give the third dose of quinine.

Autopsy eighteen hours after death.—Rigor mortis very marked. Injection of arachnoid, some punctation, in the white substance of the cerebral hemispheres. Congestion of base of lungs; heart bleached, without appreciable lesion. Some greenish fluid in stomach; hyperaemia of mucous membrane of this organ; liver increased in size, turgid with blood, of a deep red color; spleen much softened, and of natural size; one ounce of muddy urine in bladder; kidneys normal.

CASE IV.—[XXXIII OF BOOK.]

Julio Boutty, Frenchman, journeyman watch-maker, entered the hospital of Nossa Senhora d'Ajuda, on the 21st Sept., 1873. From the 17th on, had begun to lose appetite, have headache, and feel prostrated during the night. On the 20th, at 6 P. M., had a severe chill, followed by fever and sweating; took three Dehaut's purgative pills, and dieted. On the 21st, at 7 P. M., had a second chill, attended with great precordial oppression, and followed by uneasiness and indefinable general malaise. These symptoms becoming more and more aggravated, at 10 o'clock he came to the hospital. He was ordered a stimulant draught, two grammes of sulphate of quinine in two doses, sinapisms to the extremities, and a purgative and anti-spasmodic enema.

Present condition, 22d, 11 A. M.—Face profoundly changed, and bathed in cold and clammy sweat; great agitation, the patient moving about constantly in bed, changing his position and uttering deep sighs; general alidity, only on the forehead some warmth noted; axillary temperature 37.4 [99.3 F.]; pulse 110 and small; tongue cold and much furred; great thirst and anorexia; epigastric pain, increased by palpation; vomiting, which had appeared after swallowing the second dose of quinine, and is excited whenever the stomach receives remedies or broth; liver a little larger than normal; spleen within its physiological limits; belly meteorized; two large evacuations induced

by the enema of the evening before; urine scanty and high-colored, without albumen. Respiratory system sound.

Prescription:—

Murray's liquid magnesia with elixir of paregoric*, sulphuric ether and tincture of nux. vomica, in spoonful doses.

Sinapisms to epigastrium and extremities.

Three small enemata containing each one gramme sulphate of quinine, to be given three hours apart.

Broth and wine.

At 7 P. M. the vomiting had completely ceased; algidity and agitation less pronounced; temperature 37.6 [99.6 F.], pulse 110. The interne on duty repeated the two last enemata, adding to each 15 drops of Sydenham's laudanum, as the others had been expelled as soon as given. The patient continued to take Port wine.

23d. No vomiting; warmth re-established in all parts except hands and forearms; axillary temperature 37.6 [99.6 F.], pulse 100; tongue still coated, of normal temperature. Had a large evacuation at 6 A. M. No deafness of cinchonism.

Prescription:—

Three small enemata containing each 6 decigrammes of sulphate of quinine and ten drops of laudanum (to be given three hours apart).

The same mixture, alternating with wine.

Stimulant friction, with camphorated alcohol, of upper and lower limbs.

The patient showed great improvement on the 24th, and kept on recovering gradually, being discharged on the 4th October. The doses of quinine were diminished progressively till the 27th Sept., when they were entirely suspended.

CASE V.—[XXXIV OF BOOK.]

Ricardo, mulatto slave, joiner, living in the Rua do Lavradio, was brought to the Mizericordia Hospital on the 7th July, 1869, and placed in an isolated room, because the physician, who had seen him

*[Ext. op. gm. 3; acid, benzoic, gm. 3; camphor, gm. 2; alcohol(60°), gm. 650.]

in his master's house, diagnosticated cholera. Being on duty in the clinical lecture-room, I was invited by the director of the sanitary service to see the patient and give my opinion of him. I went to the room, attended by the students, and here the following history was furnished me: Ricardo was subject to attacks of erysipelas, and had elephantiasis of the leg; had suffered from intermittent fever during February and March of the same year, contracted in the town of Estrella. Some days before the appearance of the serious symptoms observed, he was attacked by rheumatoid pains in the legs, and at the resting-time allowed the workmen (from noon to 2 o'clock), he went to lie down.

On the 6th June, at mid-day, he took a Le Roy's cathartic given him by a companion, and at five in the afternoon ate two oranges. At 10 P. M. had a violent chill, followed by vomiting and profuse diarrhoea. At 6 the following morning (7th), cramps and hiccough appeared.

Present condition.—Face altered in expression; eyes deeply sunk in the orbits; voice low, stifled and wearied; absence of elasticity in the skin, dents remaining on pressure; complete algidity; very painful cramps in the legs; pulse 120, very small and hard; tongue cold and furred; devouring thirst; frequent vomiting, excited whenever patient drinks water; profuse diarrhoea. The patient arrived at nine in the morning, and at ten had already had two evacuations. The matter evacuated consisted of a serous fluid tinged with bile; no rice-water evacuation, nor vomiting; liver and spleen enlarged; the right as well as left hypochondrium sensitive to pressure; belly retracted and tense; urine very scanty, without albumen; intellect unimpaired, as is also the respiratory system.

After hearing the history and examining the patient, I diagnosticated a choleraic pernicious fever. I named 12 students to examine the patient, one each hour, and took charge of his treatment at the request of the director of the hospital.

Prescription:—

Canella water.....	gm. 90
Bisulphate of quinine.....	gm. 2
Ext. opium.....	gm 0.15
Essence of peppermint.....	qtt. 6
Syrup of ether.....	gm. 30

A tablespoonful every hour.

Infusion of flax-seed.....	gm. 250
Whites of eggs.....	no. 2
Bisulphate of quinine.....	gm. 2
Sydenham's laudanum.....	gm. 2

For four enemata, one every two hours.

Sinapisms to upper and lower extremities, and epigastrium.

Frequent friction over the whole body with a mixture of tincture of valerian, tincture of mustard, and ethereal tincture of phosphorus.

At 5 P. M., I found the patient better. The evacuations had lessened a good deal; vomiting and cramps had ceased; the algidity continued, but less marked in trunk and face; on the side of the voice and skin the symptoms persisted in the same degree. The last enema had been given shortly before, and the mixture was not yet finished. The frictions had been made four times by the students. In place of the mixture, after it was exhausted, I ordered 120 grammes of good Port.

8th. Reappearance of vomiting and increase of diarrhoea; the algidity, even in the extremities, is less; frequent hiccoughs supervened in the morning, and still persisted at the visiting-hour (8:30 A. M.) The other symptoms remained the same; pulse 108.

Prescription:—

Same medication as that of the evening before.

A small blister to epigastrium.

9th. I am informed by the internes, and by the students designated to visit the patient every hour, that he improved sensibly from 3 P. M. on. During the night he continued the use of the mixture, but at longer intervals between the doses. At the visiting-hour the improvement was more satisfactory; all the symptoms were less intense; the vomiting, diarrhoea and hiccoughs had entirely disap-

peared. Only in the upper extremities, which were kept uncovered, was any lowering of the temperature noted; pulse 96; voice clearer and more resonant; the skin had recovered in part its normal elasticity; tongue still furred; slight thirst; liver and spleen decreased in size; abdomen more flaccid; urine more abundant, and high-colored, no albumen.

Prescription:—

Same mixture, with one gramme only of sulphate of quinine, and five centi-grammes extract of opium.

Same enemata with three decigrammes of sulphate of quinine each, and four drops laudanum.

Two frictions per day with same mixture.

Two mutton-broths with port wine; very hot coffee.

10th. Improvement progressing. The second broth excited vomiting, which ceased spontaneously. Face more flushed; eyes still sunken; voice stronger and intelligible; temperature normal; pulse 92 and fuller; tongue hardly furred at base; slight thirst; abdomen flaccid; two evacuations in 24 hours; liver a little enlarged, spleen normal; urine extraordinarily abundant, color normal; deafness of cinchonism.

Prescription:—

Six decigrammes of sulphate of quinine in coffee.

Rich port wine, gm. 120, in tablespoonful doses.

Two frictions per day.

Meat broth; coffee.

From the 11th on, the hourly visits ceased, which had been made by the medical students, as the patient progressively improved. He took sulphate of quinine to the 13th (3 decigrammes the last two days). Left hospital on the 24th.

CASE VI.—[XXXVI OF BOOK.]

Senhora D. M., aged 35, married, mother of four children, nursing the last, ten months of age, residing in the Rua da Floresta, in Catumby, was attacked by a violent chill two hours after breakfast, in March, 1870. She vomited copiously, had very intense colic, and whenever the attacks of colic appeared, her hands and

feet grew cold. Her brother, who was a student of medicine of the 6th year, believing it an indigestion, prescribed a mixture containing tincture of camomile and nux vomica, and a purgative enema, containing castor oil and electuary of senna. At 9 P. M., thinking her condition very serious, he came to ask me to see her.

Present condition.—Physiognomy indicating great prostration and dejection; the patient is convinced she will die, and bewails her lot in lamentable phrases, but with a wearied husky voice; violent cramps; complete algidity of entire body; pulse so frequent, small and wiry that it was impossible for me to count the number of pulsations; tongue large, moist and rose-red; devouring thirst; frequent vomiting, spontaneous or excited by swallowing any sort of fluid; abdomen painless everywhere; frequent and profuse diarrhoea. The patient had in three hours seven evacuations, always preceded by colic, which ceased as soon as the desire to purge was satisfied. The two first stools, excited by the purgative enema, were fecal, the others wholly serous. The extreme debility of the patient did not allow her to seek the close-stool, and the evacuations were passed in bed. There was no congestion of the spleen or liver. The urine was not examined, as the patient had urinated when she had the first dejection.

Sinapisms to the extremities, hot water bottles round the body, stimulant and aromatic frictions, diffusible stimulant mixtures, with full doses of opium, ether capsules, wine, enemata of sulphate of quinine, tincture of valerian and musk, such were the means successively or simultaneously employed, and administered by my own hands, until 2 o'clock in the morning, without the slightest benefit. At a quarter past three the patient expired. The paroxysm lasted ten hours.

CASE VII.—[XXXV OF BOOK.]

Antonio Villares, Portuguese, aged 48, resident of Maximbomba, where he was engaged in agriculture, entered the Santa Izabel ward on the 1st of June, 1872, with all the symptoms of malarial cachexia and paroxysms of quotidian intermittent fever.

Despite the large doses of sulphate and valerianate of quinine which he took, the paroxysms appeared regularly on the 2d, 3d, 4th, 5th and 6th, characterized by the three stages, and separated by a complete apyretic interval always the same in extent. These paroxysms appeared from 3 to 4 in the afternoon, and terminated at dawn the following day.

On the 7th of June, at the visiting hour, I found the patient in the following condition: Profound prostration; perceptible lowering of temperature in upper and lower limbs; axillary temperature 36.4 [97.5 F.]; pulse 120. The patient is bathed in profuse perspiration; his garments, pillows, bed-clothing and mattress were wet; over the face, trunk and limbs the sweat ran abundantly; one would have said the patient had been immersed in water. The Sister of Charity reports that this profuse perspiration dated from 4 in the morning, and that the linen had been changed twice. Tongue very furred; intense thirst; great congestion of liver and spleen; the latter viscus two fingers' breadth beyond the left costal border; belly tense; constipation; urine scanty, without albumen; heart enlarged and weak; systolic bellows murmur at base of precordial region; two bellows-sounds in carotids; cough infrequent and dry; dyspnoea; fine subcrepitant rales at base of left lung. I diagnosed a sudoral or diaphoretic pernicious attack, and made the following:—

Prescription:—

Sulphate of quinine.....gm. 2

Valerianate of quinine.....gm. 2

Gummy extract of opium.....gm. 0.45

Soft extract of cinchona.....q. s.

F. 18 pills. One every hour, together with two tablespoonfuls of "Agua Ingleza."

A stimulant cathartic enema.

Sinapisms to extremities.

At 3 P. M. the patient appeared better; but at 5:30 the perspiration again became as profuse as in the morning, and true algidity declared itself. At 8 P. M. epileptiform convulsions set in, and death occurred at 11 P. M., preceded by a short period of coma.

Autopsy performed ten hours after death.—Very marked anaemia of cerebral centers; the white and gray matter of cerebrum and cerebellum less consistent than in normal state. These organs seemed to have been macerated in water for several days. Medulla oblongata very pale, but of physiological consistency. Lungs sound, barely edematous, infiltration at base of left. Heart enlarged, pale, flabby, easily breaking down, pitting on the slightest pressure; dilatation of left auricle and right ventricle, with thinning of their walls; some eccentric hypertrophy of left ventricle; valves and orifices normal. Liver very large, hardened, of dark red color, presenting in right lobe some zones of dirty yellow; the cut surfaces were dry, a little blackish blood flowing from them on pressure. Gall-bladder containing but little bile, very compact and dark. Spleen hypertrophied, 18 centimeters in its larger diameter and six in its transverse [7x2 1-2 inches], very hard, and resisting the edge of the scalpel. Kidneys pale and of normal size. The gastrointestinal canal was not examined.

VII.

Ardent pernicious fever is exclusively characterized by the excessive heat which the patient presents in the second stage of the paroxysm (105.5, 106, 106.8, 107.6 F.), and by the prolonged duration of this stage (18, 24, 36 and 48 hours).

After such an elevated temperature, the thermometer rapidly falls below 98.6, a short agony appears and death takes place.

This form of pernicious fever is rare with us, and usually terminates fatally. In ten years' time I observed only two cases, and the patients died. Three elements are necessary to the exact diagnosis of the disease, to know that the patient is under the influence of the malarial poison, that he has none of the diseases exciting great increase of febrile heat (variola, scarlatina, pneumonia, meningitis), and that this heat exceeds certain limits. For this latter the thermometer becomes indispensable.

CASE VIII.—[XXXVII OF BOOK.]

Camillo, free mulatto, driver of a diligence, 32 years old, very robust, living in Mataporcos, entered the Santa Isabel ward on the

28th of July, 1867, Has suffered from paroxysms of quotidian intermittent fever, attended by facial neuralgia, for a fortnight. When he entered the hospital (at 5 P. M.) he complained of great pain in the right temporal region, and had very high fever.

The physician on duty prescribed a diaphoretic mixture containing tincture of aconite and acetate of ammonia, a purgative enema, and one gramme of sulphate of quinine, to be given as soon as the fever lessened.

29th. Present condition.—Face very flushed and swollen; eyes brilliant; temperature of skin very high; pulse 120, full and hard; pain in right facial region; tongue covered with very thick white fur; great thirst; nausea; epigastrium sensitive to pressure; liver enlarged; spleen larger than normal; belly tense; two evacuations induced by enema; urine scanty and very red; nervous and respiratory systems in normal condition.

Prescription:—

Twenty leeches to anus.

Six wet cups to hepatic region.

An emetic mixture containing ipecac and antimony.

Two grammes of sulphate of quinine in two doses, after operation of emetic.

At 3 P. M., after the leeching, cupping and emesis, the patient perspired profusely and had less fever. At this time one gramme of sulphate of quinine was given him in a glass of sulphuric lemonade.* At 6 o'clock, in spite of finding himself much hotter, he took the second dose of the remedy.

30th. Prostration of strength; skin very dry and hot; pulse 128, less full and hard; absence of pain in face; tongue very coated; greater enlargement of liver and spleen; same sensitiveness of epigastrium; constipation; urine very scanty and high-colored; respiratory organs sound; no delirium; insomnia.

Prescription:—

A mixture containing two grammes of bisulphate of quinine, and an equal dose of tincture of digitalis.

A purgative enema.

Stoll's antiphlogistic beverage, ad libitum.

*Acid, sulphuric (at 1.84), gm. 2; water, gm. 900; syrup, gm. 100.

At 5 P. M., the patient was in the same condition; at 4 in the morning of the 31st he became comatose, with cold extremities; died at 7 A. M.

Autopsy nine hours after death. Some injection of vessels of brain and meninges; lungs and heart normal; great congestion of liver and spleen; very intense reddening of mucous membrane of stomach and duodenum; kidneys hyperaemic.

CASE IX.—[XXXVIII OF BOOK.]

Joaquim Soares de Mello, Portuguese, 29 years old, farm laborer, residing in Itaguahy, entered the Santa Izabel ward 12th August, 1875, with malarial cachexia. Under the use of pills composed of sub-carbonate of iron, soft extract of cinchona, and sulphate of quinine; of the *Agua de Inglaterra*, frictions of tincture of iodine to the hypochondria, and restorative diet, the patient was improving perceptibly.

On the 2d September the interne found him, at 8 in the morning, with a temperature of 106.2 F. At the visiting-hour the Sister of Charity informed me that he had had a violent chill at 9 the night before. The tongue was very furred. There was no change in any of the other organs. The liver and spleen, which had been still enlarged the evening previous, had not increased in size. An emetic, and one gramme of sulphate of quinine after its action, were the means used that day. At 5 in the afternoon, in spite of copious emesis, and the dose of quinine which was well borne, the temperature reached 107.3. The interne prescribed a mixture of tincture of digitalis and veratrine, which did not produce the slightest benefit. At 2 on the morning of the 3d, the patient expired. Autopsy revealed nothing special beyond hypertrophy of the liver and spleen, eccentric hypertrophy of the left ventricle of the heart, and paleness of the white substance of the brain.

VIII.

The comatose form, the most frequent after the algid, is characterized by the sudden appearance of coma or carus, without preceding delirium or other sign of cerebral excitement. From simple sopor to true apoplectic carus, we observe in this form of pernicious

fever the diverse grades of collapse of the innervation of the brain. Sometimes the febrile reaction is slight or even null, sometimes the patient appears with a very high temperature, accompanied usually with a pulse small, infrequent, and concentrated or even intermittent. The existence of hemiplexia, coincident with the comatose condition, when this condition depends directly upon a pernicious paroxysm, has been justly disputed by the most eminent pyretologists.

In none of the cases observed by me, has the patient been hemiplegic. Complete relaxation of the upper and lower limbs, relaxation of the sphincters of the anus and bladder, giving rise to involuntary evacuations of feces and urine, more or less complete loss of general and special sensation, and abolition of reflex movement, are the symptoms attending the coma.

The comatose form is that most frequently met with in the cases where a pernicious paroxysm has not been preceded by simple intermittent attacks. Thence arises the reason why the inexperienced practitioner will often find himself embarrassed in making a precise diagnosis, especially if he does not attend to a certain number of circumstances foreign to the symptomatology.

Cerebral hemorrhage, apoplectic cerebral congestion, and cerebro-meningitis in the second stage, are the three diseases which may be confounded with a pernicious paroxysm of comatose form, when no attack of simple intermittent fever, frank or masked, has preceded, or when no person interested in the patient's health is found at his side to furnish information of the previous history. The two first affections, essentially apyretic, can only be confounded with pernicious fever when during the paroxysm to be recognized, the patient has a temperature normal or below normal. The third, essentially febrile, will only be taken into account if the thermometer reveals the existence of fever.

In cerebral hemorrhage, the apoplectic coma either lasts for some hours and disappears, leaving in its place the symptoms of paralysis, or it has a long duration and is followed by death. In the former case, doubt in regard to diagnosis will be very transitory; in the second, the extension of the hemorrhagic center, or the capital importance of the part of the brain affected, give such expressiveness

to the array of symptoms that the diagnosis is very prominently marked. The pallor of the face, the puffing out of the commissure of the lips during expiration ("fumer a la pipe"), the coolness of the extremities, the excessive smallness and concentration of the pulse, the absolute inertia of the limbs, the rapidity with which these symptoms appear, or the nature of the prodromata preceding them, guide the physician safely in the path of truth. Moreover, cerebral hemorrhage demands certain pathogenic conditions which are easily appreciable in the majority of cases.

Rupture of the vessels is induced: by changes in their walls (arteritis deformans, atheroma, fatty degeneration, miliary aneurism); by lessening of consistency of perivascular tissue (the hemorrhagiparous softening of Rochoux); by increase of tension of the blood (hypertrophy of the heart with valvular lesion, chronic lesions of the respiratory organs); or by changes in the crasis of the blood (pyaemia, scorbutus, chlorosis, haemophilia, cholaemia, malarial cachexia). As we shall see in the paragraph especially devoted to the diagnosis of pernicious fever in general, there are a certain number of signs which serve as a guide to the physician in perplexing cases, and which are fully applicable to the comatose form.

In cerebro-meningitis, before the appearance of the coma, the patient evinces symptoms of cerebral excitement, which are very marked if the inflammation is seated in the upper or convex portion of the brain, and of little intensity, or transitory, if the basal regions are especially compromised. These symptoms of excitement (delirium, convulsions, spasms), precede the comatose stage, whether this stage be connected with the compression of the nervous substance by the meningeal exudate (effusion) or whether it be the expression of the collapse of the brain which is always observed when the excitability of that organ has been induced for a long time or with exaggerated intensity (cerebral neurolysis). In comatose pernicious fever, as already stated, there are no preceding phenomena of cerebral excitement, the coma is primary. Thus, even though the patient present great febrile reaction, the manner in which the disease began will serve to exclude cerebro-meningitis from the diagnosis.

The previous existence of acute articular rheumatism, the coincidence of pain and swelling of the joints, are valuable elements by which to distinguish cerebral rheumatism of apoplectic form from comatose pernicious fever.

The precedence of delirium or convulsions, together with the presence of a large amount of albumen in the urine, help us not to confound uraemic disease of the brain with comatose pernicious fever. The phenomena peculiar to convulsive hysteria, or those proper to anomalous hysteria, are of avail for the recognition of hysterical coma.

CASE X.—[XXXIX OF BOOK.]

Luiz Poyares, Portuguese, 35 years old, carter, strongly built, residing in Andarahy Grande, entered the Santa Izabel ward on the 17th August, 1874. He had suffered from intermittent fever in February, 1873, according to several students who had seen him in the 5th ward, where he was under treatment for several days. Having entered comatose at 6 o'clock in the evening, the physician on duty prescribed a stimulant purgative enema, blisters to the legs and six leeches to each mastoid process. The persons who brought in the patient could tell nothing about him but his name, age, residence and occupation.

18th August. Present condition.—Face flushed and congested; moderate degree of coma; when urgently aroused, the patient opens his eyes and utters some confused and unintelligible words, falling at once into the same stupor; resolution of upper limbs, some automatic movements in lower; absence of paralysis of motion; deadened sensation; pupils a little dilated; exaggerated heat in frontal region, axillary temperature 39.6 [103.3 F.]; pulse 90, hard, belly tympanitic; hepatic region painful—strong pressure over this region excites some contractions in patient's face, indicating pain; the liver is three fingers' breadth beyond the right costal margin; spleen larger than normal; the tongue cannot be examined, notwithstanding efforts to this end; the purgative enema of the evening before has excited one large evacuation; the blisters have burned

well, and the leeches have drawn a little blood; the patient has urinated in bed, and the bladder is empty.

Prescription:—

Twenty leeches to margin of anus. A purgative enema, and after its action, an enema every three hours, containing one gramme of sulphate of quinine, until four have been taken.

One gramme of sulphate of quinine on the denuded surface left by blisters.

As soon as patient can open his mouth and swallow, to take one gramme of sulphate of quinine in a glass of sulphuric lemonade.

At 5 P. M. the interne and two students designated by me, found the patient much better. Only two enemata of quinine had been administered. The leeches had drawn enough blood, and it still flowed from some of the bites. The purgative enema produced a copious evacuation. The coma had in great part disappeared. The patient answered questions put to him, but with difficulty. Intelligence dull, axillary temperature 38.2 [100.8 F.]; pulse 86. The interne gave with his own hands one gramme of sulphate of quinine, which the patient took very well by mouth, and advised the two remaining enemata to be given.

19th. Condition extremely flattering; deafness of cinchonism very manifest; entire absence of cerebral symptoms; intellect clear, answers very precise; axillary temperature 37.4 [99.3 F.]; pulse 78; tongue large, moist, and hardly coated at base; appetite; belly relaxed, liver still enlarged, as also the spleen; urine a little loaded with sediment.

Prescription:—

One gramme of sulphate of quinine by mouth.

One gramme of sulphate of quinine by enema.

Natural Vichy water.

Frictions with tincture of iodine in hepatic region.

Soup and broth.

The doses of sulphate of quinine were gradually diminished up to the 22d, when they were suspended. The patient had fuller diet day by day, and was discharged convalescent on the 26th.

CASE XI.—[XL OF BOOK.]

Sabino, free mulatto, 50 years of age (supposed), was brought to the Santa Isabel ward on the 5th September, 1875, at 8 A. M., in a state of profound coma. The person who accompanied him reported that on the 4th, at 2 P. M., he had chills, and then fever, which lasted till noon next day; was better up to nightfall, having taken merely rosemary tea and burnt brandy, which caused him to sweat profusely.

Present condition.—Profound coma; face puffy; resolution of all four limbs; axillary temperature, 39.8 [103.6 F.]; pulse 86; belly tympanitic; liver much congested; spleen of normal size; respiratory system normal; urine not examined.

Prescription:—

Twenty leeches to verge of anus, and six to each mastoid process.

Blisters to calves of legs.

A stimulating purgative enema, and after its action, an enema every three hours, containing one gramme of sulphate of quinine, until four are taken.

At 2 P. M. the patient died, having hardly taken the first enema of sulphate of quinine.

Autopsy nineteen hours after death.—Great injection of arachnoid, pia-mater and cerebral tissue; sero-sanguineous effusion into lateral ventricles; thoracic organs sound; liver much enlarged, turgid with blood, and of dark red color; spleen slightly enlarged, friable, breaking down easily on slight traction of its parenchyma; bladder contracted, mucous membrane hyperaemic; and containing about an ounce of urine free from albumen; stomach and intestines normal.

IX.

In the cerebro-spinal form, frequent in excitable persons of marked nervous temperament, and in second childhood, some anomalies are observed in the succession of the cerebral symptoms, so that the experienced practitioner recognizes that he has not to do with a clear, primary, proto pathic or essential cerebro-meningitis. When the febrile stage supervenes, delirium appears, almost

always noisy and attended by great agitation. If the delirium is very intense or prolonged, it is temporarily succeeded by coma, reappearing later on the paroxysmal exacerbation of the fever. During the hours of febrile remission, when the thermometer indicates lessening of a degree or more [centigrade] in the axillary temperature, whether or not there be perspiration, the patient is calmer, or becomes comatose if the cerebral excitement has been very exaggerated. Strabismus, general or partial convulsions, cramps, subsaltus tendinum, carphologia, crucidismus, and all other cerebral symptoms which appear, undergo notable oscillations in the course of the twenty-four hours, closely following the variations of febrile temperature. The liver and spleen, which remain untouched in idiopathic cerebro-meningitis, increase in size, and become congested and painful in cerebro-meningeal pernicious fever.

CASE XII.—[XLI OF BOOK,]

There entered the hospital of Nossa Senhora da Ajúda, in February, 1872, a lad 12 years of age, shop-boy, with high fever (102.9 F.) dry skin, headache, tongue furred, liver a little congested, and bowels constipated. These symptoms had been preceded by a severe chill the night before. At the visiting-hour (10 A. M.), I prescribed an emetic of ipecac and antimony, a purgative enema, sinapisms to the lower extremities, and one gramme of sulphate of quinine to be given as soon as the fever should diminish, the skin become moist, and some evacuations occur. The patient vomited and purged profusely, became free from headache, and completely apyretic at 3 P. M., when the nurse gave him the dose of quinine in a glass of sulphuric lemonade. As soon as the medicine was swallowed it was rejected by vomiting. The zealous and intelligent interne of the establishment, on being informed of this, ordered the same dose of quinine repeated in four pills, which the lad took at 5 P. M., drinking after them half a glass of sulphuric lemonade strongly acidulated.

At 8 P. M. the headache and fever re-appeared, without preceding chill, and the next day I found the patient in the following

condition:—Great agitation, and delirium; face flushed; eyes brilliant and injected; the boy tries to get out of bed, believing himself threatened by hell-hounds present in the ward; great loquacity; convulsive tremor of upper limbs; convergent strabismus of both eyes; exaggerated heat of forehead; axillary temperature 40.2 [104.5 F.]; pulse 128; tongue tremulous, dry, with a rust-colored spot in the center; abdomen ballooned, tympanitic, and very sensitive to percussion, especially in hepatic region; liver enlarged; spleen of normal size; urine scanty. The patient would not allow suitable exploration of respiratory organs.

Prescription:—

Twelve leeches to verge of anus, and six to each mastoid process.

A mixture containing 8 grammes of laurel-water, 10 centigrammes of extract of belladonna, 2 grammes of bisulphate of quinine and 30 grammes of syrup of hyoseyamus; to be given in spoonful doses every two hours.

A stimulant and purgative enema, and after its operation, two enemata of sulphate of quinine of six decigrammes each, at four hours interval.

Blisters to calves of legs.

Compresses steeped in oxycrate and frequently renewed upon the shaven head.

At 8 P. M., visiting the patient for second time, I found him with paralysis of the esophagus, drowsiness interrupted by sub-delirium, lower extremities cold, and belly very swollen. The axillary temperature was 40.8 [105.5 F.]; and the pulse 136, very small and weak. At 3 the following morning he died. No autopsy was performed.

CASE XIII.—[XLI OF BOOK.]

A boy of 7 years, always enjoying good health, was attacked by a sub-continued fever, which resisted for three days the various antipyretic means employed to combat it. The attending physician, presuming that it was a pyrexia of malarial origin, administered 6 decigrammes of sulphate of quinine during full febrile reaction. Three hours later the child was bathed in sweat, the heat diminished, and the pulse lost a little of its frequency. Two hours after this

remission induced by the quinine, the fever increased, the skin became dry again, the pulse very frequent, and a series of grave nervous symptoms appeared: delirium, convulsive movements of upper and lower limbs, general hyperaesthesia and opisthotonos. Thirty-six hours after the appearance of these cerebro-spinal phenomena, I was called to see the little patient, who had at his bedside three distinguished physicians, his very near relatives, Doctors Benjamin Ramiz Galvas, Sebastian Saldanha da Gama, and Queiroz Carreira.

Present condition.—Incomplete coma; delirium when patient is aroused from the comatose state; sharp cries, groans; sighing respiration; automatic movements of upper limbs; spasm of lower limbs; general hyperaesthesia, particularly in the calves; opisthotonos and some trismus; tongue dry, difficulty of deglutition; belly prominent and tympanitic; liver increased in size; spleen very large and sensitive to percussion; febrile heat marked; pulse frequent and small; some mucous rales scattered over both lungs.

Prescription:—

A mixture containing two grammes of bisulphate of quinine,
to be given in teaspoonful doses every hour.

Blisters to thighs.

A purgative and anti-spasmodic enema.

Fomentations to spine with mercurial and belladonna ointment.

Contrary to the expectations of all, the little patient managed to recover at the end of three weeks, making constant use of the sulphate of quinine in decreasing doses. He remained deaf for a week.

§X.

The convulsive form is very common in early infancy. The child, after some simple intermittent attacks, or in the enjoyment of perfect health, is seized with convulsions, which sometimes become general, constituting a true attack of eclampsia, or are partial and limited to the muscles of the face and one of the upper limbs. These convulsive paroxysms are at times accompanied from the beginning with well-marked febrile reaction, or again the fever appears only after they have ceased.

In general the convulsions are attributed to the process of dentition, or to the presence of intestinal worms, or to a disturbance of digestion. Cathartic medication is usually employed, and after its operation the little patient uses an anti-spasmodic mixture. The convulsive movements cease, the child reacquires its usual briskness, and everything indicates that the danger is past. But later on the paroxysm recurs, more violent and prolonged than the first, and leaving as a trace of its passage a comatose condition of the highest gravity. If the first attack rarely occasions the death of the patient, the second is as a rule fatal, and only by a rarely-observed exception is life maintained after the third.

For the diagnosis of the convulsive form of pernicious fever, the physician should keep in view the precepts to be formulated further on, as well as the existence of fever, seeing that as a general rule, the reflex convulsions connected with difficult dentition, indigestion, or the presence of *ascarides lumbricoides* in the intestines, are not attended, preceded or followed by the febrile state.

CASE XIV.—[XLIII OF BOOK.]

A child, three years of age, female, strong and healthy, daughter of a physician residing in Sao Christovas, became dumpish and lost appetite, going to lie down a greater part of the day, instead of running about and playing as she was used to do. Her mother noticed that from noon on, the palms of her hands kept very hot, and she perspired much during the night. The father gave her a purgative of castor oil, and prescribed frictions of sulphate of quinine in aromatic vinegar.

On the 12th June, 1874, the child was seized with a violent attack of convulsions, which lasted from 5 in the afternoon to 8 at night. After the convulsive movements, entirely clonic, fever appeared, together with coma. When I saw the little patient, at 8 A. M. on the 13th, the coma had already disappeared, there was still some fever, the tongue was furred, the liver much enlarged, and the abdomen doughy. I ordered an antimonial mixture and sulphate of quinine internally, in coffee, by enema, and in frictions. The mixture produced profuse vomiting, evacuations and diaphoresis. The child took six decigrammes of quinine by stomach, the same by

rectum, and two grammes of the same drug by skin. At 6 P. M. I found her without fever and doing well, asking for food.

On the 14th, 15th, 16th, 17th and 18th, she continued the use of sulphate of quinine, in gradually diminished doses. She recovered entirely and regained her usual strength.

CASE XV.—[XLIV OF BOOK.]

A boy five years old, blonde and lymphatic, son of a foreign merchant residing in the Rua S. Clemente, was suddenly attacked by convulsions at night-fall of 21st December, 1873. The physician called to see him thought it a case of indigestion, as the child had eaten cauliflower cooked with butter at dinner, and bananas for dessert. This opinion seemed indisputable, since the stomach had rejected by vomiting during the convulsions a part of the food ingested, in an advanced stage of chymification. A purgative enema, 32 grammes of castor oil, and later on a mixture of the tinctures of camomile and belladonna, were the prescriptions during the night of the 21st, and the 22d. The boy remained during the latter day greatly prostrated, with entire loss of appetite, and insomnia. Whenever he dozed a little, he awakened with a start, calling on his mother. At 5 P. M., fresh convulsions appeared, tonic and clonic, prolonged till 6 o'clock the following morning. I saw the patient in consultation at 8 A. M. I found him with upper and lower extremities completely algid and bathed in clammy sweat; pulse extremely frequent and small; the trunk, especially the chest, with a very high temperature, and also covered with profuse perspiration; respiration oppressed and stifled; intellect dull, with drowsiness; belly tympanitic; liver enlarged and painful on palpation and percussion; spleen normal; tongue furred, and urine much decreased. I diagnosticated a convulsive pernicious fever, considered the case hopeless, and advised the use of sulphate of quinine in large doses, by the mouth, by enema and by friction; "Agua de Inglaterra," sinapisms to the extremities, and fomentation of abdomen with oil of camomile and essence of turpentine. All this was done, but in vain; the boy died at 2 in the afternoon.

§ XI.

In the delirious form of pernicious fever, the patient presents, as the predominant symptom during the paroxysm, a delirium of varying character. Sometimes it is furious delirium, a true acute mania; the subject becomes greatly agitated, cries, vociferates, insults and attempts to injure the people about him, tries to get out of bed to fly; believes himself threatened and pursued by vindictive enemies, hears voices insulting him, etc. This form of delirium, which is that most frequently observed with us, is often accompanied by fever; but again is present without the least febrile reaction. After it has lasted for the space of some hours, the intellectual disturbance calms little by little, reason regains its rule, and profuse perspiration bathes the entire surface. The patient falls into a lethargy, and sleeps quietly and deeply.

In other cases the delirium does not manifest itself so briskly; the patient becomes irascible, intolerant, inconsequent and unreasonable; he commits improper acts, at variance with his education and habits; he expresses himself in unaccustomed terms to his friends and relatives; he seems entirely different from what he is in his normal state. These unusual phenomena, which ordinarily pass unnoticed at the beginning, are sometimes attended by hallucinations of the senses. I have seen a child seven years of age attacked by paroxysms of pernicious fever, characterized as follows: At 10 o'clock at night he awaked with general tremors, due to a violent chill; then he began to cry out, saying that many fierce dogs were trying to bite him, and pointed to one corner of the room where he said these dogs were. Thus he passed two hours, surrounded by his parents, trying to pacify him, and then became bathed in sweat. The crisis passed, he slept tranquilly, and arose the following day well, with barely some loss of appetite and depression. He had three paroxysms, gradually more serious and prolonged. They had given him a vermifuge, supposing the illness to depend on the presence of *ascarides lumbricoides* in the intestinal canal.

When I was called to see the patient, he had had the third attack, and was still agitated, uneasy, and overpowered by a certain terror.

The pulse was frequent and the temperature of the skin above the normal. The tongue was covered with fur, and the bowels constipated and doughy. The liver and spleen kept their physiological size. I prescribed a purgative of castor oil and 75 centigrammes of sulphate of quinine, to be given in three doses, one every two hours, after the operation of the cathartic. The night of this day the child had an intermittent paroxysm, characterized by the three stages, but no delirium nor hallucinations. The sulphate of quinine was continued in the same dose three consecutive days, and afterwards in doses progressively diminished. At the end of a week the boy was completely cured.

CASE XVI.—[XLV OF BOOK.]

Josi Goncalves Tinoco, Portuguese, aged 37, employee of the Tramway company of S. Christovao, residing in the Rua do Machado Coelho, entered the Santa Izabel ward on the 11th July, 1873. Had had at various times attacks of intermittent fever, and presented the external appearance of malarial cachexia. Is not a hard drinker.

Present condition.—Yellowish pallor of face and rest of body; conjunctiva pale; no dropsy; axillary temperature 38.8 [101.8 F.]; loss of appetite; nausea; constipation; liver and spleen enlarged; cardiac sounds normal, bellows murmur in carotids; respiratory and urinary organs normal.

Prescription:—

An emetic of ipecac and antimony.

One gramme of sulphate of quinine after operation of emetic.

Friction with tincture of iodine in right and left hypochondria.

Chicken broth, coffee and wine.

The patient had an attack of fever on the 13th and 14th; the first began at 6 P. M., and ended at 11 the following day. Took this day 12 decigrammes of sulphate of quinine in two doses, the first at noon, and the second at 3 P. M. The other paroxysm appeared at 8 P. M., which terminated at 2 in the afternoon of the 15th. The patient took one gramme of sulphate of quinine at 3 P. M., and another gramme at 7 P. M. At 9 o'clock occurred another attack, accompanied by a violent delirium, which rendered the use of a strait-

jacket necessary. The following day I found the patient still delirious, bathed in profuse sweat, with axillary temperature of 39.2 [102.5 F.] and pulse 120; tongue very furred; liver still more enlarged than on preceding days, and spleen of same size as observed up to then.

Prescription:—

Water.....	gm. 100
Bisulphate of quinine.....	gm. 3
Sulphate of morphine.....	gm. 0.05
Syrup of orange-peel.....	gm. 30

A tablespoonful every hour.

A stimulant and purgative enema.

Blisters to calves of legs.

At 5 P. M., the interne found the patient calm, with only some sub-delirium; had slept quietly two hours; body bathed in profuse perspiration; axillary temperature 38.6 [101.5 F.], and pulse 98. The mixture not yet exhausted; the blisters had not yet drawn.

17th. Nearly absolute deafness, necessary to shout to make patient hear; wandering and vertigo; no delirium; axillary temperature 38.2 [100.8 F.]; pulse 90; large amount of sweat soaks the patient's garments and bed-clothing; tongue still much coated; liver greatly enlarged, but a little less than the day before; spleen in same condition; two bilious stools from enema; urine less, bilious, free from albumen; respiratory organs sound; for the first time a soft and systolic bellows-murmur heard at base of heart, extending to apex.

Prescription:—

Same mixture, reducing the dose of quinine to 12 decigrammes.

A purgative enema.

120 grammes of rich port wine, in three doses.

Chicken broth.

18th. The patient complains of great confusion in head, buzzing in ears, and can sit up in bed only with difficulty on account of faintness (cinchonism); deafness continues, but less; no delirium, extreme contraction of pupils; some tremor in upper limbs; quiet

sleep the night before; axillary temperature 37.6 [99.6 F.]; pulse 64; still profuse perspiration; tongue less coated; some appetite, distaste for broth; little thirst; three very large bilious stools from enema; liver much less enlarged, as also spleen; urine scanty, bilious, passed with pain and difficulty (dysuria); abnormal murmur of heart persists.

Prescription:—

Canella water.....	gm. 180
Soft extract of cinchona.....	gm. 8
Tincture of valerian.....	gm. 4
Sulphuric ether.....	gm. 4
Syrup of orange-peel.....	gm. 30

To take two tablespoonfuls every two hours.

Full-bodied port wine, 120 grammes, to take half a glass every two hours, alternate with mixture.

A purgative enema.

Friction of hypochondria with tincture of iodine.

Rice soup, coffee.

19th. Perceptible improvement in cerebral symptoms due to cinchonism; vertigo disappeared; deafness decreasing; still some dizziness when patient gets out of bed to go to stool or take medicine. He remains lying down and answers well, questions put to him. Still some tremor in upper limbs noted; axillary temperature 37.5 [99.5 F.]; pulse 72; decrease of sweating; tongue less furred; liver and spleen in same condition; one bilious stool immediately after enema; urine more abundant, richer in bile-pigment, passed more easily and with less pain; cardiac bellows-murmur still heard.

Prescription:—

Same mixture and same dose of wine.

Four grammes of calisaya in powder, in coffee, at noon.

Chicken broth, soup.

The cerebral symptoms dependent on the action of the sulphate of quinine disappeared little by little; the patient continued to gain strength, and on the 24th, began the use of pills composed of 15 centigrammes of sulphate of iron, 10 centigrammes of soft extract of cinchona, and 5 centigrammes of sulphate of quinine (3 pills daily), of "Agua de Inglaterra" and a restorative diet consisting of meat, bread, wine and coffee.

He was discharged on the 5th August, still retaining some paleness of face and mucous membranes, and some enlargement of the liver.

In this case of delirious pernicious fever, the grave attack appearing in a cachectic person, who had had simple paroxysms rebellious to progressively increased doses of sulphate of quinine, it was necessary to have recourse to this drug with great vigor, producing in the system the symptoms of therapeutic poisoning, in order to save it from the miasmatic poisoning. I am convinced that it would have been impossible otherwise to obtain the happy result which crowned the medication employed. The symptoms observed in the patient on the 17th and 18th July, give us a very exact idea of the action of the sulphate of quinine in large doses on the nervous and urinary systems. The fear of aggravating the symptoms produced by cinchonism, which had already attained a high degree of intensity, led me to suspend the sulphate of quinine on the 18th, and to replace it by 4 grammes of calisaya from the 19th on.

CASE XVII.—[XLVI OF BOOK.]

There entered the hospital of Nossa Senhora d' Ajuda, in March, 1874, a young Portuguese, of twenty-odd years, residing in the Rua d' Ajuda, who presented as his only morbid manifestations a loquacious delirium and congestion of the liver. The pulse was 80, and temperature 37.6 [99.5 F.]. This was at 10 A. M., and when I saw the patient half an hour after, I ordered two grammes of sulphate of quinine in two doses, at three hours' interval. At 6 P. M. the delirium became so furious as to require the use of a strait-jacket, the pulse more frequent, and the temperature rose to 39.5 [104.1 F.]. At 10 P. M. coma came on, attended by profuse sweat and cooling of the extremities, and at 2 in the morning the patient died. A friend who took charge of the patient, informed the interne that the unfortunate young man had been ailing for a week, and that every afternoon he had been seized with a paroxysm of fever, without having made use of any treatment.

§ XII.

In the neuralgic form of pernicious fever, very frequent in Rio de Janeiro, are observed external neuralgias or visceralgias, which constitute the perniciousness of the attack. Among the former the most commonly noticed are neuralgia of the 5th pair (facial), left intercostal, crural, sciatic, and temporo-occipital; among the latter, the chief are gastralgia, hepatalgia, splenalgia, ovaralgia and hysteralgia. The same occurs with the neuralgias accompanying pernicious paroxysms as with other phenomena characterizing perniciousness; they either exist together with fever, or are entirely apyretic (masked fevers). Sometimes they disappear completely when the paroxysms terminate; sometimes merely lessen in intensity, to recur later with extreme violence.

Left intercostal neuralgia is at times accompanied by severe palpitation of the heart, pallor of the face, oppression and dyspnoea, simulating an attack of angina pectoris. When this group of symptoms is observed, the pernicious paroxysm is termed "cardialgic."

Occipito-temporal neuralgia is at times attended by giddiness, ringing in the ears and photophobia. Gastralgia may be accompanied by vomiting, hepatalgia by jaundice, and ovaralgia and hysteralgia by hysteriform convulsions.

CASE XVIII.—[XVII OF BOOK]

F——, merchant, 45 years of age, Portuguese, went to Porto das Caixas on business. He was there ten days, and when he returned to the city he felt only fatigued and had poor appetite. Two days after his return, on a Sunday morning, he felt indisposed after breakfast, vomited all he had eaten, and about noon was attacked by a facial neuralgia, attended by fever. He took, of his own accord, some homeopathic doses of tincture of *nux vomica* and tincture of *aconite*. At 9 P. M. the intensity of the neuralgic pain and fever, as well as the oppression and uneasiness he suffered, obliged him to call a physician of Hahnemann's school.

The next day the patient's condition was so delicate that his family decided to change the style of treatment, calling in consultation the Councillor Felix Martius, Dr. Paula Costa, and myself,

selected to take charge of the case. We found the patient in the following condition:—Face red and flushed; right eye much injected, lachrymating and very sensitive to light; intense pain over the whole right side of face, forehead, and skull; pulse full and frequent; skin hot and dry; tongue covered with a thick coat of white fur, tending to dryness at tip; insatiable thirst, constant nausea, and at times vomiting; great sensitiveness of epigastrium and right hypochondrium; liver much enlarged; spleen a little increased in size, bowels constipated; urine scanty and high-colored; agitation; insomnia; from time to time some delirium, which turns on business affairs; respiration accelerated, at times suspirious; no physical signs on percussion and auscultation of the heart and lungs.

Prescription:—

Twelve leeches to verge of anus.

Emetic mixture of ipecac and antimony.

Mixture of two grammes of sulphate of quinine, after operation of emetic.

Veratrine ointment to right side of face and body.

A purgative enema containing asafetida.

On the following day I found the patient much better. The face was less red, less painful, and the right eye less injected and weeping. Pulse less full and frequent; temperature of skin less elevated; tongue less furred and moister; epigastrium painless on pressure; liver smaller; the nervous symptoms are of less intensity; patient slept quietly for three hours; respiration less accelerated; the emetic caused profuse vomiting and four stools; the quinine mixture, given in spoonful doses every hour, had been repeated at 8 P. M. The patient at the hour of my visit had taken three grammes of the sulphate of quinine.

Prescription:—

The same mixture, in spoonful doses, every two hours.

Currant shrub as beverage.

A purgative enema containing asafetida.

Same ointment for face.

Improvement progressed gradually, and the dose of bisulphate of quinine was daily lessened. Ten days after the consultation

Senhor F., was convalescent, and went later to Tijuca, whence he returned perfectly recovered.

CASE XIX.—[XLVIII OF BOOK.]

Entered the hospital of Nossa Senhora d' Ajuda, in February 1874, a mulatto slave, thirty-odd years old, ill made and anaemic, who complained of intense pain in precordial region, accompanied by oppression and dyspnoea. The interne of the establishment, although very talented and well-informed, when he examined him at 8 A. M., believed it to be a case of commencing pleurisy, and ordered four wet cups to be applied to the seat of pain. Two hours after on my next visit to the ward, I found the patient in the following state:—Sitting up in bed, since the horizontal decubitus caused him great uneasiness; extremities cold; axillary temperature 38.2 [100.8 F.]; pulse frequent and small. Acute pain in precordial region; exacerbated by pressure, percussion, and movements of respiration; no physical signs furnished by auscultation and percussion; no cough; great dyspnoea; tongue slightly furred; great thirst; anorexia; liver and spleen normal; bowels constipated; urine scanty, but normal.

Although the patient assured me that his disease dated from the night before, and that until then he enjoyed good health, I diagnosed a pernicious attack of cardialgic form, said that the prognosis was very grave, and ordered him two grammes of sulphate of quinine in two doses, as well as a diffusible stimulant mixture, into which entered tincture of musk, ether, valerian and opium. To the seat of pain application was made of compresses steeped in a concentrated solution of cyanide of potassium. All was in vain; at 3 P. M. the patient died, having become completely algid an hour before.

CASE XX.—[XLIX OF BOOK.]

A boy of 9 years, residing in the Rua da Conceicao, very lymphatic and feeble, after taking a long walk in March, 1875, on an excessively hot day, complained later of a pain in the right thigh, which did not allow him to walk with freedom. At 9 P. M. he had fever, and so remained till the following day, when he was seen by the family physician, who only prescribed a diaphoretic

mixture and a fomentation of camphor and opium. Later the pain of the thigh increased greatly in intensity, the fever was exacerbated and delirium set in. At 8 the next morning I saw the patient in consultation. He had already taken six decigrammes of sulphate of quinine; he was delirious, and presented some convulsive movements in the left arm and muscles of the same side of the face; he had high fever, and a pulse of extraordinary frequency. The liver was congested and the belly tympanitic. A purgative and anti-spasmodic enema, 12 decigrammes of sulphate of quinine in two doses, taken in small enemata after the operation of the first one, blisters to the calves of the legs, repeated frictions to the spine, axillas and groins with 90 grammes of aromatic vinegar holding in solution 8 grammes of sulphate of quinine, were the remedial means I advised and which were agreed to by the attending physician. At one o'clock in the afternoon the boy died.

CASE XXI.—[L OF BOOK.]

Paulo Valdez, Spaniard, 40 years old, clerk in a cigar factory in the Rua dos Ourives, very thin and pale, entered the Santa Isabel ward on the 12th May, 1861. Has had intermittent fever at various times, and three years ago was taken with severe hæmoptysis, for which he was treated in the same ward. Is suffering from gonorrhoea, a month old, for which various injections have been used. On the day of his entering the hospital at noon, he had a severe chill, followed by intense pain in the epigastrium, vomiting, and later, fever. His suffering increasing in the afternoon, he decided to go to the hospital at 7 P. M., having requested to be treated by the distinguished professor and councillor, Dr. Valladao (Baron de Petropolis). The physician on duty prescribed for him a mixture containing laudanum, tincture of camomile and tincture of nux vomica.

13th. Present condition.—Face pale; general emaciation, evident signs of impoverished nutrition; pulse 98; temperature of skin a little above normal; tongue much coated; vomiting from time to time, especially on swallowing a large amount of water; very intense thirst; pain in epigastrium, lessened by pressure with a pillow, and

at times exacerbated, extorting cries from the patient; liver a little enlarged; spleen normal; evacuations natural; belly retracted; urine free from albumen; cough frequent at night, muco-purulent expectoration, little dyspnoea; fullness on percussion of infra-clavicular region and supra- and infra-scapular region of right side; thoracic resonance of other parts of same side diminished; normal resonance all over left side; very frequent subcrepitant rales and broncophony in right infra-clavicular region; gurgling in the points corresponding to the space limited by the internal border of upper third of right scapula and vertebral canal of same side; subcrepitant rales in supra-spinous fossa; very rough friction-sound at lower angle of scapula and in axillary region; puerile respiration in left lung; heart normal.

Prescription:—

Ipecac in powder, 12 decigrammes; divide into 4 doses;
take one every half hour.

Six decigrammes of sulphate of quinine, to be taken after emesis by ipecac.

Infusion of cinchona and musk.....360 grammes.

Syrup of tolu.....	30	"
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In wineglassful doses every two hours.

The patient hardly vomited twice. He took the quinine at 1 P. M. At 3 he was seized by a chill, and the epigastric pain became extraordinarily violent, obliging him to roll on the floor of the ward. At 6 o'clock he had hiccoughs and was algid, and died at 9 P. M.

Autopsy 12 hours after death. Nothing noteworthy in cranial cavity. Strong adhesions of right lung with pleura, especially in posterior aspect; tubercles in different stages of development occupy the whole of the upper lobe of right lung; two cavities in top of same lobe, one the size of a pigeon's egg, the other of a small nut; the lower lobe of the same lung is compact, hardened and slightly crepitant; in the left lung are noted some tuberculous granulations scattered through upper lobe; in the lower portion of this lobe a tuberculous nodule the size of an almond, composed of a hollow friable mass, which, when divided with the handle of a scalpel, opens a regular cavity with smooth homogeneous walls; dilatation of right

ventricle of heart, with thickening of its walls; two indurated plaques in horizontal portion of arch of aorta; stomach containing bile and mucous, vessels somewhat injected; liver enlarged, congested, of a dark red color; spleen of normal size, but its parenchyma very friable; nothing appreciable in intestines, kidneys and bladder.

The history of the disease of Valdez, the course it followed, its unexpected termination, the unusual violence of the gastralgia, and the absence of anatomical lesions which could explain his speedy death, left not the least doubt that it was a case of gastralgic pernicious fever. The eminent practitioner who took charge of the patient was of this opinion, although he had some tendency to believe, at the commencement, in the existence of tubercular peritonitis in process of evolution. In the absence of any important symptoms of this affection, he had recourse to the sulphate of quinine, giving thus one more proof of his prudence and high professional standard. In connection with this case, the Baron de Petropolis mentioned to the students several cases of gastralgic pernicious attacks observed by him; making, in regard to the diagnosis of this affection, some remarks of great practical value.

CASE XXII.—[LI OF BOOK.]

Jose, black slave, kneader of bread, residing in the Rua D. Manuel, 50 years old (supposed) entered the Santa Izabel ward on the 31st May, 1874, at 6 A. M. Is addicted to alcohol and has suffered from buboes. On the night of the 30th, was attacked by a pain in the hepatic region, at first not severe, but which became later so violent as to force him to groan and cry out from midnight to the time he was brought to the hospital. The interne ordered applied to the seat of pain a flax-seed poultice, very hot and well sprinkled with laudanum, which produced some immediate relief, but of short duration.

Present condition.—Face distorted, expression of great pain; patient lies on his belly in bed, bending a little to the right; profuse cold and clammy sweat bathing entire surface; acute pain in hepatic region, starting from center of this region and extending forward to epigastrium and behind to back—increased by pressure and per-

cussion, as also by respiratory movements and cough; pulse 92; axillary temperature 37.2 [99 F.]; tongue large, moist, and rose-colored; vomiting; the size of liver cannot be well ascertained, as the patient will not allow suitable examination of right hypochondrium; no jaundice; spleen normal; bowels swollen and constipated; urine clear and lessened in amount; bellows murmur in sternal region, percussion sound at point corresponding to right border of second piece of sternum; first cardiac sound not distinctly heard at left nipple; respiratory system sound.

Prescription:—

Valerianate of quinine.....	2 grammes.
Extract of hyoscyamus.....	30 centigrammes.
Extract of stramonium.....	30 centigrammes.
Extract of opium.....	20 centigrammes.

Divide into 12 pills; one every two hours.

A purgative enema.

Essential oil of turpentine.....	30 grammes.
Oil of hyoscyamus.....	30 "
Tincture of opium.....	30 "
Chloroform	30 "

To foment hepatic region every three hours.

Contrary to the expectations of all, the patient died a little after noon, having barely had time to take two of the pills and use the fomentation twice.

Autopsy 21 hours after death.—In the cranial cavity the only lesion noted is atheromatous degeneration of the basilar artery. Extensive patches of atheroma in ascending aorta, horizontal portion of arch, and descending aorta; dilatation of this vessel to extent of 4 centimeters, from origin of innominate; fatty degeneration of heart, induration of sigmoid aortic and mitral valves; lungs normal; stomach and intestines normal; liver enlarged, presenting various discolorations on its external surface: at some points a dark green color, at others light yellow, deep red or mahogany red. On cutting the parenchyma of the liver, a great flow of blood is observed; the surfaces of the section present the same variety of color as the external surface. A great part of the right lobe undergoing fatty degeneration. Spleen normal; kidneys fatty.

I presume that I am not deceived in considering this case an example of hepatalgic pernicious fever. Simple hepatalgia, though causing the patient great suffering, does not have the duration of the pain of the negro Jose, and does not terminate fatally in little over twelve hours. Might the liver been selected for the local seat of perniciousness because it was already suffering from chronic lesions due to alcoholism? It is very probable, the more so as this is observed in a great majority of cases, in every other organ suffering from a chronic disease, when a pernicious paroxysm bursts forth.

§ XIII.

The pneumonic form of pernicious fever is very frequent with us. At times the inflammation of the parenchyma of the lung appears alone, invading the more central parts of the lung, without the pleura also being attacked; again, there is a true pleura-pneumonia observed, with severe stitch in the side and other symptoms of the disease when primary and idiopathic. In this latter case, it is very rare for the diagnosis to be well established until the further progress of the affection clears it up.

During the paroxysm, which is always accompanied by high fever, the lung becomes exhaustively congested. In the beginning, that is, for a few hours after the initial chill, the lesion does not pass the congestive stage, and auscultation reveals merely great weakening of the respiratory murmur at some points of the lung, crepitant or subcrepitant rales at others. If the attack is of short duration, the stage of pulmonary hepatization is not developed; upon the remission, the parenchyma of the organ reacquires wholly or in part its physiological permeability, until a fresh paroxysm makes it again impermeable. But when the attack is very prolonged, or when the type of fever is sub-continued or even remittent, the hyperaemia of the lung is followed by extra-vascular exudation, the exudate hardens and the pulmonary zone in which this phenomenon occurs becomes hepatized; auscultation reveals the existence of bronchial respiration, and percussion of the wall of the chest, at the points corresponding to the lesion shows complete loss of resonance. Under the appropriate treatment generally used in

pneumonia, the hepatization begins to disappear, but as soon as the fever recurs, and the paroxysm returns, either the same pulmonary region now becoming permeable, becomes again hepatized as it was before, or other portions are affected, the pneumonia extending in surface and depth.

In pneumonic pernicious fever dyspnoea is always very marked, and is not in proportion to the extensiveness of the pulmonary lesion; the cough is often dry and infrequent, and when there is expectoration the sputa remains bloody for several days.

The course of the fever in a case of pneumonic pernicious fever is very different from that observed in a simple essential pneumonia, and this is doubtless the best source of differential diagnosis for the physician. In inflammation of the lung, the temperature rises rapidly, attains a high degree, reaches its apogee in the short space of some hours, and here remains for several days, with slight oscillations of three to five-tenths of a degree [centigrade] less in the morning and more in the evening. From the fourth to the eighth day of the disease; with us usually on the fifth day, the temperature falls rapidly, reaches the physiological limit, or even some tenths of a degree below it, and there occurs what modern physicians term defervescence. At the same time the febrile heat ceases, the local resolution of the pneumonia commences, the exudates begin to break down, this liquefaction being denoted by subcrepitant rales ("return-rales"), which replace, little by little, the bronchial respiration; expectoration becomes more easy and profuse; the urine increases in amount and becomes very rich in urates, phosphates, and alkaline chlorides.

In pneumonic pernicious fever, the febrile heat follows the evolution of the paroxysms, sometimes assuming the frankly intermittent type, sometimes the remittent, with a difference of one or two degrees [centigrade] between the morning and evening temperatures. As to the local lesion, it either remains the same in spite of the cessation or sensible diminution of the fever,—which is very rare, and even, so to speak never observed in idiopathic pneumonia,—or it decreases sensibly while the febrile reaction persists with slight remissions, and then we must seek another explanation

for this fever; or, it begins to be resolved as the paroxysm declines, and recrudesces when another paroxysm develops, and we know that simple pulmonary inflammation never takes this course. Thus the anomalies in the progress of the temperature, the want of harmony between the fever and the local condition of the lung, are very important circumstances in the diagnosis of pneumonic pernicious fever. The value of these two signs becomes evident in the two following cases.

CASE XXIII.—[LI OF BOOK.]

Joas Paulo Dias, Portuguese, tailor, 32 years old, residing in Pedregulho, entered the Santa Izabel ward on the 15th June, 1872, at 6 P. M. Never suffered from intermittent fever, but had yellow fever with black vomit in March, 1860, two months after coming to Brazil. Is very subject to catarrh of respiratory organs, and whenever he takes cold remains hoarse for several days.

On the 14th, in returning to his house, at 8 P. M., it rained and he wet his feet. On the 15th had a severe chill, attended by stitch in right side and some cough. Later on had high fever, the pain in side became more intense, and he spit some blood. He was brought to the hospital in a carriage, and the physician on duty prescribed a mixture containing 10 centigrammes of tartar-emetic and 16 grammes of acetate of ammonia.

16th. Present Condition:—General condition satisfactory, nothing in external appearance indicating impoverished nutrition. Axillary temperature 38.8 [101.8 F.]; pulse 90; intense pain in right side of thorax, 2 centimeters below and behind nipple, exacerbated by respiration and especially by cough; some dyspnoea (28 respirations per minute); frequent dry cough; tenacious and bloody sputum noticed in spit-cup. It is recognized by percussion that the resonance of chest-wall is diminished in lower third of right side, especially in anterior and lateral aspects. Auscultation reveals existence of friction-sound in axillary region to its anterior limits, crepitant rale 4 centimeters below the nipple, and subcrepitant rales from lower third of scapula downwards, absence of bronchial respiration and broncophony, some exaggeration of vocal

resonance at points where there is dulness; nothing abnormal observed on left side. Tongue much furred; loss of appetite; thirst; bowels constipated; liver and spleen of normal size; urine scanty and high-colored.

Prescription:—

Five wet cups to anterior and lateral surfaces of right side of chest, lower third.

Infusion of ipecac containing 10 centigrammes of tartar-emetic.

At 5 P. M. the interne found patient much relieved from pain, but with more dyspnoea (32 respirations per minute); temperature 40.2 [104.4 F.], and pulse 120. Physical signs on auscultation and percussion of chest not mentioned in case-paper.

17th. Great dyspnoea (38 respirations per minute); cough very frequent and dry; pain in side but slightly intense; dullness on percussion of lower third of right side of chest, in all three aspects, increased vocal vibration at these points, friction, bronchial respiration and broncophony very marked; nothing abnormal in left side. Temperature 39.5 [103.1 F.]; pulse 108; tongue still much furred; liver a little enlarged. The patient felt great relief after application of cups; the emetic mixture produced copious vomiting and three large evacuations.

Prescription:—

Five more wet cups to right side of chest.

Infusion of polygala.....gm. 360

Nitre gm. 4

Acetate of ammonia.....gm. 16

Syrup of tolu.....gm. 30

A wineglassful every two hours.

At 5 P. M. the interne found the patient with a temperature of 40.6 [105.2 F.]; pulse 112; respiration much accelerated (38), and some delirium. He ordered him a mixture containing 2 grammes of tincture of digitalis and 8 grammes of laurel water.

18th. Temperature 40.2 [104.4 F.]; pulse 108; tubular respiration all over right lateral aspect of chest, posterior aspect to lower angle of scapula, and forward to beneath the nipple; also bron-

cophony at these points, and percussion-sound completely dull. On the left side is noted puerile respiration in upper two thirds, and subcrepitant rales in lower third. Cough rare, no expectoration; 38 respirations per minute; entire cessation of pleuritic pain; tongue covered with yellow fur; loss of appetite and great thirst; liver enlarged and painful; spleen normal; urine scanty and bilious; no delirium, nor any symptoms on side of nervous system.

Prescription:—

Calomel, one gramme in three doses, to be given one every two hours.

Sulphate of quinine, two grammes, in three doses; to take one in a glass of sulphuric lemonade every three hours after purgative effect of calomel.

A large blister to right side and back of thorax.

At 5 P. M. the interne found the patient in the same condition, with a temperature of 40.5 [105 F.], pulse 120, and respiration still much accelerated (36). The blister had not yet burned, and the calomel had produced only one stool; first dose of quinine not yet given.

19th. Patient had six large evacuations during the night. Took first dose of quinine at 5 o'clock in the morning, and the second at 8 A. M. (12 decigrammes). Temperature 38.9 [102 F.]; pulse 100; patient groans with pain from dressing of blister an hour before, and does not allow proper exploration of chest. The ear, applied very lightly to thorax wall, perceives distinctly the tubular sound. Cough more frequent and loose, sputa viscid, bloody and yellowish; tongue less furred; liver smaller; urine bilious.

Prescription:—

Sixty centigrammes of sulphate of quinine now (9:30 A. M.), and sixty more at noon (2 grammes, 60 centigrammes in seven hours).

Confection of marsh-mallow with 8 grammes of bicarbonate of soda and 12 grammes of acetate of ammonia, sweetened with syrup of squill.

Two meat broths.

At 5 P. M. the interne found the patient bathed in profuse

perspiration, with a temperature of 37.8 [100 F.], and pulse 82. The cough was frequent and loose, expectoration easy, and the sputa continued bloody. Thorax not examined for fear of exciting pain.

20th. Marked improvement. Complete apyrexia; temperature 37.2 [99 F.], and pulse 76; respirations 24; cough loose, sputa yellowish, abundant, and some of them bloody; percussion cannot be made on account of pain due to blister.

Auscultation reveals the existence of great numbers of subcrepitant rales mingled with tubular respiration, especially in axillary region, broncophony and bronchial cough. Tongue cleaner; some appetite; liver less enlarged; patient had three evacuations; urine more abundant and heavily loaded.

Prescription:—

Sixty centigrammes of sulphate of quinine now (9

A. M.), and same dose at noon.

Same alkaline drink.

Three meat broths.

At 5 P. M., temperature 37.2 [99 F.]; pulse 68.

21st. Progressive improvement. Temperature 37.2 [99 F.]; pulse 64; deafness of cinchonism, sensation in ears as of a waterfall, the noise of which we perceive at a distance; cough very loose, expectoration easy, sputa yellowish, and some slightly tinged with blood; still dullness on percussion of lower two thirds of entire posterior aspect of right side of chest, and of lateral aspect; bronchial respiration heard only at level of lower angle of scapula and axilla, in rest of lung very coarse subcrepitant rales; tongue large, moist and rose-colored; appetite; two evacuations in 24 hours; liver almost normal; urine abundant and less turbid.

Prescription:—

Sulphate of quinine.....one gramme.

Good port wine.....120 grammes.

To take half a glass every two hours.

Dress blister with cerate.

Soup, broth, coffee.

On the 23d, the use of sulphate of quinine was suspended. The tubular sound had completely disappeared, and the subcrepitant rales

were replaced by coarse and infrequent mucous rales. The pulse remained slow till the 26th, due without doubt to the action of sulphate of quinine upon the circulatory system. The only medication employed up to the 5th July was wine of cinchona, in the dose of 180 grammes daily. The patient was discharged that day perfectly recovered.

CASE OF XXIV.—[LIII OF BOOK.]

Felicissimo, mulatto slave, 36 years old, joiner, well built and robust, addicted to abuse of alcoholic drinks, entered the Santa Izabel ward on the 28th May, 1874, at 2 P. M.

On the 26th, after leaving the shop in which he worked (Rua de S. Pedro), he returned to his master's house (Rua Formosa) without feeling the least indisposed. He supped well at 9 P. M., and drank to excess. He rose unwell on the 27th, complaining of headache. His master, supposing he had been intoxicated the night before (as he was accustomed), chastised him with a stick and made him carry a dozen casks of water for the use of the household. On finishing this task, which Felicissimo performed with much effort, he felt a stitch in the left side of the chest and some chilliness. At 5 P. M. he had high fever, and after coughing a little, spit blood. They gave him some cups of infusion of elder-flowers with tincture of aconite, and a foot-bath; but on the 28th, finding himself no better, he was seen by a physician, who prescribed wet cups to the seat of pain, and an antimonial mixture. This prescription was not filled, and the patient was sent to the hospital. The physician on duty had his colleague's orders carried out.

29th. Present condition.—Face very flushed, with a red spot in left malar region; eyes injected, weeping, very sensitive to light; very intense frontal headache; axillary temperature 40.5 [105 F.]; pulse 100, full and hard; acute pain in left lateral aspect of thorax, and lower border of axilla, exacerbated by cough and respiratory movements; cough dry and frequent, two sputa almost wholly of blood noticed in spit-cup; dyspnoea, especially owing to stitch in side (26 respirations per minute). On percussion, some diminution of resonance in lateral aspect of left side of thorax; friction-sound

in axillary region, especially perceptible during cough, and the only symptom revealed by auscultation; nothing abnormal in right lung. Tongue covered with white fur; anorexia and great thirst; bowels doughy and constipated; liver enlarged; urine scanty and high-colored. The antimonial mixture has produced vomiting and some perspiration.

Prescription:—

Twelve leeches to anus.

Six wet cups to left side of thorax.

Calomel, one gramme (in three doses).

Castor oil, 60 grammes; to take two hours after last dose of calomel.

Sulphate of quinine 1 gramme; to take after free purging.

At 5 P. M. the interne found the patient much relieved from the pleuritic pain, with a temperature of 39.2 [102.5 F.], and pulse 90. Had not yet taken the sulphate of quinine.

30th. Exacerbation of stitch; frequent cough, many sputa of frothy red blood; greater dyspnoea than the evening before (32 respirations per minute); friction-sound all over axillary region and in anterior part of left side of chest; fine subcrepitant rales at same points; more marked decrease of thoracic resonance. Temperature 40.5 [105 F.]; pulse 108; tongue less furred, but a little dry at tip; belly softer, liver still greatly congested; urine same as last evening. The patient had six stools, and took the sulphate of quinine at 7 P. M.

Prescription:—

Mixture contains 2 grammes of sulphate of quinine and 30 grammes of diacodium syrup.* In three doses, at two hours' interval.

Six more wet cups to left side of chest.

Infusion of Cipo Chumbo† with syrup of gum [Arabic] as beverage.

At 5 P. M. manifest improvement. Pain very bearable; absence of bloody sputa; temperature 38.6 [101.5 F.]; pulse 82; stethoscopic

*[A mild opiate preparation.]

†[*Cuscuta umbellifera* or *C. racemosa* (Martius).]

signs about the same. The interne ordered the ptisan continued.

31st. Pleuritic pain hardly perceptible; two bloody sputa during morning; cough more infrequent; little dyspnoea (22 respirations per minute); friction sound very notable during respiration, subcrepitant rales rarer and coarser—still diminution of resonance on percussion; temperature 37.8 [100 F.]; pulse 80; tongue clean in great extent; belly soft; liver still enlarged; urine more abundant and less loaded.

Prescription:—

A blister to left side of chest to be dressed with basilicon ointment.

Same mixture of sulphate of quinine.

Same ptisan as beverage.

Meat broth.

1st June. The temperature of evening before noted in case-paper (37.4) [99.3 F.] without further information; which indicates that the patient did well during day. At the visiting-hour he complained bitterly of the pain caused him by the dressing of the blister, made at 7 A. M., and which still torments him. Did not spit blood; has coughed but little. Will not allow the least exploration of left side of chest. Temperature 37.2 [99 F.]; pulse 88; tongue good; belly soft; one large evacuation in 24 hours; liver little enlarged; dysuria; patient presents signs of cantharidal cystitis.

Prescription:—

Mixture containing one gramme of sulphate of quinine.

Emollient confection containing 4 grammes of nitre.

Belladonna ointment to hypogastric region.

Two rice soups, stew.

2d June. Functions of urinary system re-established. Temperature the previous evening 37.2 [99 F.]. The patient thinks himself well, and begs urgently for better diet. In the region of the chest occupied by the blister are still heard friction-sound and some mucous rales; little cough, expectoration rare, sputa mucous; respiration normal (20); tongue large and moist; appetite; liver almost normal; temperature 37.2 [99 F.]; pulse 80.

Prescription:—

Sulphate of quinine.....45 centigrammes.

Wine of quinine.....120 grammes.

Chicken stew, broth, coffee.

The use of quinine was suspended on the 3d; the patient continued to have better diet, and was discharged on the 10th perfectly well. A little friction-sound was still heard in lower part of left axilla on deep inspiration.

In this case the diagnosis was established from the very first day the patient was examined. The intensity of the fever, the high degree of temperature,—in contrast with the local symptoms, which at the outset hardly indicated a simple pleurisy; the congestion of the liver, and the initial course of the disease, concurred efficaciously to this end. In the patient of case XXIII it was impossible, for the first two days of the disease, to recognize that it was a pneumonic pernicious fever and not an essential pleuro-pneumonia. The unusual course of the morbid phenomena, especially of the febrile heat, the appearance of the bilious element, as well as the results obtained with the first doses of sulphate of quinine, cleared up the diagnosis very much.

§ XIV.

When a person is predisposed to chronic ailments of the respiratory system—especially when he suffers from pulmonary tuberculosis,—the pernicious fever which attacks him sometimes assumes the hæmoptoic form, revealing itself by profuse hæmoptyses, which seriously compromise the patient's life, and are reproduced with a certain regularity. In the intervals of the paroxysms are observed some sputa of blackish blood, in greater or less amount, which attest the presence of coagula in the smaller bronchial ramifications. These coagula, irritating the parenchyma of the lung, excite nuclei of lobular pneumonia, the exudate of which easily passes into caseous degenerations, and thus is prepared a phthisicogenic process for the future.

The regularity with which the pulmonary hemorrhage appears at certain hours of the day, and the inefficacy of the means usually

of avail when it is not a case of pernicious fever, are elements of diagnosis which often guide us, besides others which apply to all grave forms of malarial infection, and which I shall take up minutely in the section devoted to diagnosis.

CASE XXV.—[LIV OF BOOK.]

Jose Espinheiro, Portuguese, 23 years of age, clerk, of lymphatic temperament, pale and impoverished, residing in S. Francisco Xavier, entered the Santa Izabel ward, then in charge of Baron de Petropolis, on the 8th August, 1864.

He is subject to bronchitis and laryngitis; coughs habitually, and has had more than once attacks of intermittent fever, which yielded readily to sulphate of quinine. At 3 P. M. on the day of his entry, he was seized with shivering, a sensation of severe constriction in the sternal region, and a few minutes after by a violent coughing fit, followed by a very profuse hæmoptysis. The physician on duty prescribed a mixture of nitre, ergotine and tannin, sinapisms to the lower extremities, and perfect rest.

9th. Present condition.—Face pallid, expression languid; general emaciation, clavicles and scapulas very prominent; apyrexia; pulse 76; heart normal; cough, sputa composed of little clots of blackish blood; dyspnœa; diminution of resonance in upper third of the right lung, behind as well as in front; respiration harsh, and coarse subcrepitant rales at same points, sibilant rale in lower third; respiration harsh at apex of left lung in front, mucous and sibilant rale at base and behind; tongue good; anorexia; abdominal viscera normal.

The eminent professor diagnosticated pulmonary tuberculosis in first stage of both lungs, and hemorrhage in upper lobe of right; he ordered the same mixture continued, and applied a blister between the shoulders. At 4 P. M. the physician on duty was called to the patient's aid, who had again been attacked by a severe hæmoptysis. He replaced the mixture by another containing the perchloride of iron, and ordered dry cups applied to the anterior part of chest. The interne two hours later found the patient febrile, which was mentioned in the case-paper and reported the following morning to the Baron de Petropolis.

10th. Apyrexia; pulse 78; greater confluence of subcrepitant rales in right lung; these rales are perceived over a greater extent; sputa of blood very abundant; dyspnoea more marked; panic terror, the patient believing himself irremediably lost; tongue lightly coated; bowels constipated; liver and spleen normal; urine normal.

Prescription:—

Sulphuric lemonade..... 360 grammes.

Sulphate of quinine..... 12 decigrammes.

A wine glassful every two hours.

A purgative enema of electuary of senna.

At 6 P. M. the interne carefully observed the patient, and only mentioned in the case-paper that the bloody sputa had become more numerous, the pulse more frequent (86) and the heat of skin greater.

11th.—Apyrexia; pulse 74; the pulmonary rales perceived over greater extent and less confluent; patient says he is much better; from 6 A. M. to visiting-hour (9 A. M.) spit blood only once; some dyspnoea. The purgative enema produced two large evacuations.

Same treatment, except enema.

The patient took sulphate of quinine till the 14th, in decreasing doses. The hæmoptysis did not recur, the spitting of blood ceased, and respiration continued improving.

On the 15th was prescribed an infusion of cinchona and musk with syrup of tolu, taken in wine-glassful doses during the day, a tablespoonful of cod liver oil at breakfast and dinner, and restorative diet. This treatment continued till the 24th, when the patient demanded and received his discharge. Although in better condition, his general state was not yet satisfactory; percussion revealed no notable difference in thoracic resonance; auscultation disclosed great roughness of vesicular murmur at apex of both lungs, chiefly the right, where, besides being more marked, it was of greater extent.

CASE XXVI.—[LV OF BOOK.]

A married lady, mother of two children, 28 years of age, residing in the Rua do Areal, was attacked by hæmoptysis a month

after having been treated by me for bilious remittent fever which required large doses of sulphate of quinine. She consulted me in much terror, convinced that she was consumptive. I examined her with all care at 7 A. M., and the hemorrhage had occurred at 10 the night before. I found her much disheartened, very pale, and still expelling some bloody sputa, but without fever. Some subcrepitant and sibilant rales in the left scapular region, and a little less resonance on this side, were the only morbid signs I perceived. The general condition was good. As the patient was subject to catarrh of the respiratory organs, and had lost a mother and aunt with pulmonary tuberculosis, I was inclined to believe that tubercular granulations existed in the apex of the left lung, particularly in the more internal parts of the organ, and that they had provoked the hemorrhagic flow of the previous evening. I ordered four wet cups applied to the left shoulder, and a mixture containing one gramme of gallic acid and two grammes of ergotine to be given in spoonful doses every two hours. At 3 P. M. I was urgently summoned to see the patient, and learned that she had had a severe chill, followed by fever and a second pulmonary hemorrhage, having lost less blood than the first time. I found her with high fever, pulse frequent and full, and very intense frontal headache. Auscultation revealed the existence of a greater amount of subcrepitant rales at the apex of the left lung, and percussion gave a less clear sound in the infraclavicular region. The patient spit blood frequently, in the form of reddish clots. I suspected that a pneumonia was developing, and therefore prescribed a mixture containing 15 centigrammes of tartar-emetic, and 30 grammes of diacodium syrup, and ordered a blister applied to the upper anterior surface of the left side of the chest. Great was my surprise when the following day, at 8 P. M., I found the patient entirely apyretic. This fact, and still more, the whitened appearance of the tongue, as if it had been whitewashed, led me to prescribe 12 decigrammes of sulphate of quinine in two doses. Later I found the patient without haemoptysis, and without fever, more flushed and almost without cough. Auscultation showed a few subcrepitant rales in the left lung and the resonance of the chest was perfect. There was

much distaste for food, and constipation. I ordered a saline cathartic, and recommended that the two doses of quinine should be repeated next day. Improvement was progressive; still I gave quinine for three days more, (1 gramme, 6 decigrammes, and 1-2 gramme). The respiration became good; but there was still an unaccustomed degree of roughness in the vesicular murmur at the apex of the left lung, and the voice sounded hollow at this point. These signs, together with the hæmoptysis, as well as the patient's previous history, led me to advise her to retire to Theresopolis, where she remained six months, and whence she returned stout, strong and healthy.

Perhaps some may deny this case to be one of hæmoptoic pernicious fever, and would explain the pulmonary hemorrhage by tuberculosis, the existence of which seemed very probable. But considering that the hæmoptysis continued despite the use of wet cups to the chest and an astringent mixture; that it recurred attended by fever and headache and preceded by a chill; that sixteen hours later all the febrile action had completely ceased, and the tongue preserved the appearance which generally, with us, attests the passage of a paroxysm of malarial fever; that the patient did not lose a drop more of blood after taking the sulphate of quinine, I believe that every experienced practitioner will agree with me. It is true that the circumstance of the presence of granular tubercles in the left lung concurred powerfully and immediately in the determination of the two hemorrhages by the paroxysms to that organ, which is also indisputable as regards the patient in case XXV; but, what seems beyond doubt is, that in both instances the tuberculosis played the part of predisposing cause. Without the direct influence of malarial miasm, betrayed in imperfect and insidious attacks, pneumorrhagia would not have appeared on that occasion.

§ XV.

The asthmatic form of pernicious fever is little known to foreign pyretologists, to judge by the silence they observe in regard to it in their descriptions and divisions. With us it has passed unnoticed by some physicians, otherwise of great merit and enlightened ex-

perience. The extreme gravity of the paroxysm, which is almost always single and fatal; the fact of its attacking only persons ordinarily subject to paroxysmal attacks of asthma; which leads to great difficulty in diagnosis, are the causes which explain such omissions. There are cases of asthmatic pernicious fever in which the paroxysm is accompanied by fever; but there are others in which the patient does not present the least febrile reaction, and it is then impossible to recognize the true nature of the disease before the fatal termination. The patient, adult or infant, offers to the eye of the practitioner the complete table of symptoms of asthma, exactly as they have been observed in former paroxysms. The means which have always produced relief become inert and fruitless; long before the usual period of termination of the attacks, the patient reaches the climax of asphyxia, becomes cyanotic, the extremities are icy, the body is drenched in perspiration, and death supervenes without any precursory symptoms of whatever order, announcing it. It was thus died a celebrated Brazilian surgeon, whose glory was eclipsed by the tinsel of politics, which dazzled him up to the brink of the grave. A few hours before his death he sought at an open window the air lacking to his lungs; he had recourse to a cigar, which he smoked a few minutes, for more than once he had thus lessened his suffering; he tried cigarettes of *cannabis indica*. All was in vain; instead of improving, he felt that the disease reached a degree of intensity it had never attained during the forty years it had pursued him; he recognized that his life was about to leave him; asked to be carried to bed, and a few moments after was a corpse.

CASE XXVII.—[LVI OF BOOK.]

A girl of 12 years, lymphatic and feeble, was subject to repeated asthmatic attacks from the age of 4 years. During the summer she had an attack every two months, which lasted eight or ten hours in its greatest intensity, and yielded gradually to an antispasmodic mixture. During the winter the paroxysms recurred at intervals of a fortnight, and sometimes of a week, of greater duration and severity. In July, 1874, this girl was attacked by intermittent fever. She had four simple paroxysms, which did not yield

to sulphate of quinine. The father took her to Cosme Velho, in the hope of curing his daughter by change of locality. The afternoon she arrived there she was seized by asthma, without presenting febrile reaction. They gave her the same remedies they were accustomed to, but without the slightest benefit; at 2 o'clock the following morning the child died.

§ XVI.

The rheumatic form of pernicious fever simulates a case of cerebral rheumatism. There are notwithstanding, very salient differences between the two diseases. In the former the cerebral symptoms develop at the same time as the articular; the joints become very painful, but are little swollen; many articulations are compromised simultaneously. The fever precedes by several days the appearance of the nervous and arthritic phenomena, is not accompanied by profuse perspiration, nor is there, in the course of the disease, the least vestige of inflammation or fluxion in the visceral serous membranes. The peculiar symptoms of meningitis are not observed; there is no noisy and turbulent delirium, demanding restraint; the patient has sub-delirium, convulsive tremor of the upper limbs, subsultus tendinum, carphologia, crucidismus, and at times dysphagia.

The belly becomes tympanitic, the liver enlarged and painful, the spleen also, at times; the urinary secretion is sensibly diminished and sometimes suppressed.

In cerebral rheumatism, the nervous phenomena manifest themselves after the appearance of the arthritic; the articular rheumatism begins in one or two articulations, and then becomes progressively generalized. The compromised joints are very large, red and painful. The delirium observed is usually loquacious, obliging the patient to commit unreasonable actions; cerebral meningitis declares itself openly; in some cases the pleura and pericardium are attacked by the rheumatism. The fever which attends the whole morbid process is accompanied by copious perspiration; the liver and spleen remain untouched.

I have not yet seen a single case of rheumatic pernicious fever

which did not terminate fatally. The type of fever is always remittent or sub-continued. In November, 1875, I had occasion to observe a case of this species in the hospital of Nossa Senhora de Ajuda. It was of a negro slave, who had come from an estate in the interior of the province of Rio de Janeiro, where he had long suffered from tertian intermittent fever. Coming to town, he was again attacked by the same disease, and after the third paroxysm, he presented himself with continued fever, pain in wrist joints, swelling of these articulations, and at the same time sub-delirium, tremor of the tongue and of the upper limbs, and dysphagia. The liver was enormously enlarged, the belly swollen, and the tongue dry and retracted.

Later on supervened coma, the extremities grew cold, and the patient died forty-eight hours after the appearance of the paroxysm. In this case, deprived as I was of recourse to the stomach in administering remedies—for during the last twenty-four hours not a drop of fluid passed by the esophagus,—I resorted to subcutaneous injections of the sulphate of quinine, while persisting in the use of this substance of enema. The interne of the establishment, Senhor Martius Costa, made ten injections of a saturated solution of sulphate of quinine on the inner sides of the arms and thighs, without the least favorable results.

CASE XXVIII.—[LVII OF BOOK.]

The elder son of one of the oldest and most distinguished practitioners of Rio de Janeiro was attacked by a facial neuralgia, which occurred periodically, and yielded to the use of sulphate of quinine. When he thought himself well, he had a well-marked paroxysm of intermittent fever, attended by severe pain in the knee and ankle joints. His father gave him 12 decigrammes of sulphate of quinine in two doses. In spite of this treatment, another paroxysm occurred, and the compromised articulations became swollen, enlarged, and reddened on the surface. The fever became sub-continued, delirium then set in, and later carphologia. When I saw the patient in consultation he was comatose, and died six

hours after, having taken in 24 hours three grammes and three decigrammes of sulphate of quinine (60 grains).

§ XVII.

In the syncopal, tetanic, epileptic, and aphasic forms, are observed, in the first, frequent syncope, recurring whenever the patient quits the horizontal posture; in the second, the symptoms proper to opisthotonos, with or without trismus; in the third, true epileptic convulsions, such as are met with in puerperal, uraemic or saturnine eclampsia; in the fourth, almost total loss of speech, a logoplegia without the least disturbance of the movements of the tongue.

CASE XXIX.—[LVIII OF BOOK.]

Joas Falleti, 51 years old, Italian, residing in Mar de Hespanha, (Minas Geraes), jeweler, came to Rio de Janeiro to be treated for chronic congestion of the liver and spleen, the sequelae of an imperfectly cured malarial cachexia. Lodged in a business house on the Rua do Visconde d'Inhauma, he was regularly following a course of treatment which I had prescribed in my consulting room on the 11th April, 1874. On the 19th I was called to see the patient, and found him lying down and not willing to get up, as he had already had three fainting-fits, one of which caused him to fall down and remain senseless for the space of ten minutes; the pulse was frequent, and the temperature of the skin increased; the liver and spleen continued enlarged, and the tongue was coated. The patient arose in my presence to urinate, as I wished to examine the urine, but was at once compelled to lie down, in consequence of the vertigo which seized him. I gave him a castor oil purgative, and after its operation, one gramme of sulphate of quinine. The next day at 11 A. M., I found the patient better; the vertiginous symptoms appeared only when he stood up. I pressed the sulphate of quinine four days more, and Joas Falleti returned to his former condition, continuing the use of the medicine prescribed for the chronic ailments which first led him to consult me. On the 28th June he returned to Minas completely recovered.

CASE XXX.—[LIX OF BOOK.]

Raul, negro slave, 12 years old, entered the hospital of Nossa Senhora do Ajuda on the 26th October 1874, on the third day of the disease. The evening of the 24th, he complained of a pain in the head and had fever; on the 25th he still continued febrile, and was given a purge of castor oil; at 7 P. M. he complained of difficulty in opening the mouth, and of pain in the nape of the neck. On the morning of the 26th, the physician called to see him, found him with some opisthotonos and trismus, and notwithstanding the great intensity of febrile reaction, diagnosed tetanus, and advised the patient's removal to the hospital.

Present condition.—Temperature 40.2 [104.4 F.]; no perspiration; some spasmodic contraction of the levator muscles of the lower jaw, giving rise to moderate trismus, which does not hinder the examination of the tongue nor the swallowing of fluids; no dysphagia; tetanic contraction of posterior cervical muscles, causing forced bending backwards of head; some contraction of dorsal muscles, inducing slight opisthotonos; functional soundness of muscles of upper and lower limbs; intense pain on pressure in cervical region of spine radiating to the sides; no hyperaesthesia of limbs; frontal headache; tongue very furred; belly flabby; liver enlarged and sensitive to percussion; spleen normal; urine high-colored without albumen; heart and lungs normal.

Prescription:—

Twelve leeches to cervical region of spine.

Mixture containing 15 centigrammes of tartar-emetic and 8 grammes of laurel water.

One gramme of sulphate of quinine, after operation of mixture.

Great was my surprise when I saw the patient next day. He was apyretic, without any of the tetanic symptoms of the evening before, cheerful, and asking for breakfast. The internes who closely attended this interesting case, told me that after the leeching and antimonial mixture, the child had a temperature of 37.3 [99.1 F.], and pulse 86. The mixture gave rise to vomiting, purging and profuse perspiration. The sulphate of quinine was given at 5 P. M.

and the same dose at 9 A. M. of the present day. Tongue less furred; liver less enlarged and painless; temperature 37.2 [99 F.]; pulse 88. Strong pressure made in cervical region excites some pain.

Prescription:—

Six decigrammes more of sulphate of quinine, to be taken at
1 P. M.

Simple saline mixture containing ten drops of tincture of belladonna.

Belladonna ointment to cervical region of spine.

Chicken broth.

The patient took sulphate of quinine up to the 31st; convalescence was rapid; discharged 6th November.

In this case my judgment wavered for a moment between a spinal meningitis and tetanic pernicious fever. The lack of disorders of sensation in the limbs, upper and lower, the congestion of the liver and the course followed by the disease, decided me to embrace the second opinion, besides the fact that the sulphate of quinine would have been in no respect prejudicial to the patient had the first been correct. The hyposthenic action of the antimony, and especially its effect upon the muscular system, inducing relaxation of the muscles, contributed powerfully to the promptness of the action of the quinine.

CASE XXXI.—[LX OF BOOK.]

In a lad of 14, of extraordinary talent and unbounded application, residing in the largo do Capim, and a patient of my skillful colleague Dr. Billac, I observed an instance of epileptiform pernicious paroxysms which went on becoming progressively more serious. When I saw the boy in consultation, he had already taken large doses of sulphate of quinine. But in spite of very rational treatment, at 10 o'clock the night before (the infallible hour of the attacks), he had had convulsions, preceded by hallucinations of sight, and followed by comatose sleep. The association of valerianate of quinine to the sulphate, and to opium later on, a change to Santa Thereza, and cold bathing by embrocation, cured the patient in a short time.

In 1867 entered the Santa Izabel ward the only case of aphasic pernicious fever I have observed. It was that of an Italian, Joas Victor by name, whose case, minutely noted by Dr. Monteiro de Azevedo, then one of my most distinguished pupils, as well as the clinical lecture to which it gave rise, was published in the first number of the "*Revista do Atheneo Medico*," a monthly journal conducted by the medical students, which unhappily had but a brief existence. The patient to whom I refer had aphasia by logoplegia, resided in a notoriously marshy locality, and recovered completely in a few days, thanks to the large doses of sulphate of quinine he took.

§ XVIII.

In the undefined form of pernicious fever, represented in my statistics by six cases, there is no one predominant symptom which characterizes the perniciousness; in one and the same paroxysm are noted phenomena of variable order, connected with various organic systems. In some cases every paroxysm is characterized in a different manner; in others there is a mixture and confusion of known and classical forms. In a young man who had just defended his thesis in our university when he was snatched from life, of the six very grave pernicious attacks which were the cause of his death—observed by the late Dr. Paula Fonseca, his father-in-law, by Dr. Ferreira de Abreu and myself, his attending physicians—there were no two alike. The first was clearly delirious, the second convulsive, the third delirious and neuralgic, the fourth delirious and hydrophobic, the fifth algid and the sixth comatose. The following case gives a precise idea of the form which I call undefined.

CASE XXXII.—[LXI OF BOOK.]

Manuel Carvalho, Portuguese, 40 years old, agricultural laborer, entered the Santa Izabel ward on the 1st August, 1873. Has had intermittent fever at various times, contracted in Inhauma, where he has resided. A month ago removed to Engenho-Novo, and has remained there more or less ailing.

On the 28th July was seized with a chill at 8 P. M. and afterwards had high fever and vomiting. Took a sudorific of infusion

of orange-buds and elder-flowers, and on the 29th a saline purgative. Continued ill during day, and at night had very intense headache and delirium. Dr. Titara, who visited him on the 30th and 31st, ordered six wet cups applied to region of liver, prescribed an emetic of antimony, and sulphate of quinine. This is the report furnished by a friend of Carvalho, who lives in the same house with him, and accompanied him to the ward.

Present condition.—Expression changed, physiognomy indicating profound depression; temperature 40.1 [104.3 F.]; pulse 124; sub-delirium; tremor of upper limbs; insomnia; tongue dry, tremulous, covered with yellowish fur; belly tympanitic; bowels constipated, excessively painful on palpation and percussion; vomiting; hiccough from time to time; liver and spleen much enlarged; suppression of urine, the catheter not drawing off the least amount of this fluid; dyspnoea; diminution of resonance and fine subcrepitant rales in lower third of both lungs, posterior aspect; entire absence of cough.

Prescription:—

Valerianate of quinine, 2 grammes (in six doses). Take one every two hours in half a glass of "Agua de Inglaterra."

Hydrolate of Canella (*).....150 grammes.

Tincture of valerian.....2 "

Tincture of musk.....2 "

Sulphuric ether.....2 "

Syrup of orange-peel.....30 "

(Two tablespoonfuls every two hours, alternating with the doses of valerianate of quinine.)

A purgative enema containing asafetida.

Blisters to calves of legs, 6 decigrammes of sulphate of quinine to each raw surface produced by blister.

This vigorous medication was followed regularly and exactly under the superintendence of eight students named by me, besides the two internes. The patient went from bad to worse; at 9 P. M. his extremities grew cold and coma set in; he died at 3 in the morning.

Autopsy seven hours after death.—Injection of sinuses of dura mater, arachnoid vessels and brain substance; some subarachnoid

*[One part of Canella to four of water; distill product.]

effusion; great congestion of lower lobe of both lungs, old pleuritic adhesions in right; nothing abnormal in peritoneum; liver very large and turgid with blood; spleen enlarged and softened; bladder contracted, containing about 8 grammes of muddy urine, without albumen; kidneys much congested, with their cortical substance of a very deep dark red color.

In this case, which was under the observation of the students only a few hours, it was not easy to say what was the form assumed by the pernicious fever. The nervous symptoms, such as sub-delirium, insomnia, tremor of upper limbs and tongue, authorized us to admit the ataxic form; the abdominal tympanitis, extreme sensitiveness of the belly, vomiting and hiccough, led others to accept the peritoneal form; the congestion of both lungs, perfectly characterized on percussion and auscultation, attended by great dyspnoea, made some share the idea that it was a case of pneumonic form. What was evident was, the existence of an acute and very grave manifestation of malarial poisoning, rebellious to the means employed before the patient's entering the hospital. The autopsy confirmed this judgment.

§ XIX.

The course of pernicious fever, whatever be its form, is characterized by the rapid evolution of the morbid phenomena, which go headlong to a fatal termination, or retrograde with the same rapidity, and are replaced in a few days by convalescence. Thus, as a person in the enjoyment of perfect health, being attacked by a fatal pernicious paroxysm, dies in a few hours; so also is it very common to see a patient, in danger of his life under the influence of a very grave pernicious attack, entirely safe next day. Some of the cases I have just reported fully demonstrate the reality of both the one and the other fact. There is no physician among us who has not verified for himself the truth of this assertion. Pernicious fever, then, is a disease of essentially rapid course; in a few days, and at times in a few hours, the question of the patient's life or death will be decided. To-day the gravity of the paroxysm carries him to the brink of the grave; tomorrow he may be found in so flattering a

condition as to authorize the physician to promise a speedy recovery.

If there are cases of pernicious fever in which the patient has been attacked previously by paroxysms of simple, well-marked or masked intermittent, there are also cases, unhappily numerous, in which it is the pernicious attack that opens the scene, where the subject is treacherously assailed, in the enjoyment of the most flourishing health, by the terrible enemy, without the least signal to warn of the enormous peril awaiting him. Still more, cases are not rare in Rio de Janeiro of rapid deaths caused by pernicious attacks, which appear suddenly and smite down their victims in a few hours. At certain seasons of the year, during the hotter months, instances of this sort are observed somewhat frequently, particularly if the sewerage, gas and water companies happen to be making deep and extensive excavations in the more central streets of the city. Then, the immense laboratories of telluric miasmata thus prepared, and receiving from solar rays and showers the elements necessary to their maximum activity, take charge of the poisoning of the population, which always pays them a heavy tribute.

It is very rare for a patient to have more than three pernicious attacks. He ordinarily yields to the third, where medication has become powerless. If he has not taken the appropriate medicines, or if these have not been energetically given, the fatal termination takes place in the second paroxysm. In some forms, especially the comatose and algid, the second attack is almost always mortal. Hence is deducible the important practical precept of resorting to therapeutic means with the greatest possible promptness and vigor in every case of pernicious fever. With the exception of the young candidate for a degree who died after having had six pernicious paroxysms, I never observed in any patient a greater number of attacks than three.

In virtue of the rapid course of pernicious fever, patients when they recover pass through a very mild and brief stage of convalescence.

§ XX.

The pathological anatomy of pernicious fever comprises two parts; one invariable, referable to the basis of the disease, which

is itself invariable; the other, extremely variable, referable to the numerous different forms which the disease assumes.

In many cases, especially in the graver, in those where the first paroxysm kills the patient and kills him in a few hours, pathological anatomy tells us nothing which can explain the fatal termination, and still less the sudden and rapid manner in which it occurred. It is in these cases, where there has been no time for the organs to suffer appreciable changes, that there may be some support to the opinion of the vitalists, who believe that death supervenes in consequence of the profound "sideration" which annihilates the vital force. As a general rule, the shorter the duration of the disease, the less the number of paroxysms, so much the less change do the organs present after death, especially those which were the seat of the phenomena of perniciousness during life. From the absence of post-mortem lesions which might explain death, particularly when it has surprised a person in good health, physicians conclude it to have been a case of pernicious fever. Thus think the best practitioners of Rio de Janeiro.

The invariable lesions of pernicious fever, and which are only wanting when a single paroxysm has killed the patient in a few hours, are congestion of the liver and spleen. With us, as already said and demonstrated by cases, the former of these organs receives the influence of malaria with more frequency and intensity than the latter, especially in the acute stage of the disease. Both during life, from the very commencement of the disease, and after death, where the paroxysms have been prolonged some days, the liver is much more compromised than the spleen. On autopsy the liver is found enlarged, turgid with blood, of a very deep red color, very heavy, with its parenchyma very dense, compact and hardened. In some of the gravest cases, where a violent paroxysm smites the system and extinguishes life, the flow of blood to the liver is so violent that the veins are ruptured, and a hemorrhage occurs, with its center in the interior of the organ. This fact, although reported by some foreign physicians, is still very rare, especially with us: I have never observed it, nor do I know that any colleague has done so.

The spleen is sometimes the seat of a more or less pronounced congestion; but it never attains the size it ordinarily presents in malarial cachexia, save when the pernicious paroxysm occurs after simple intermittent attacks of old date. There is one very common phenomenon in this organ, observed in the majority of cases, even when it is not sensibly enlarged, namely, softening, friability of the splenic pulp, so that it breaks down easily under the slightest traction. Some pyretologists cite instances of hemorrhagic effusions breaking down to a great extent the parenchyma of the spleen during a quickly fatal pernicious paroxysm. When I was a student of medicine, in 1858, I had occasion to observe a case of this sort in the ward of Nossa Senhora da Conceicao, for women, where the Baron de Petropolis, my revered master and predecessor, was holding the official course in the last two months of the academic year.

According to the form assumed by the pernicious paroxysms, change the various post-mortem lesions revealed by autopsy. In the comatose, and especially in the cerebro-meningeal forms, hyperaemia of the brain and membranes is met with, more or less patent according to the intensity and duration of the disease; in the pneumonic form are noted the phenomena of pulmonary congestion or hepatization. In the other forms I have described, the necropsy almost always remains mute, excepting in the dysenteric, where may be manifest the intestinal changes proper to common dysentery.

The general rule in the pathological anatomy of pernicious fever, is the existence of congestion of the liver, and at times of the spleen; great increase in the size of the former organ, diffuence and friability of the parenchyma of the latter, and absence of any lesion in the other viscera, even in those which seem to suffer most during the paroxysms. This is what is observed in Rio de Janeiro, and is what I have often observed in the autopsy-room, whither go the bodies of patients dying in the hospital wards. From this negative element, springing from pathological anatomy, the physician derives great benefit in the post-mortem diagnosis.

In 1861, a negro slave was convalescent from a lymphatitis of the scrotum in the Santa Izabel ward. The Baron de Petropolis was waiting for him to become stronger to discharge him, and had

put him on the "Agua Ingleza" solely. One morning, at the visiting hour, the illustrious professor was told that the negro was dead. Yet the evening before, he was walking about in the hospital corridors, and in excellent condition. What could have been the cause of death? Was it rupture of an internal aneurism which had passed unnoticed? Was it a "foudroyant" stroke of apoplexy? Such were the conjectures made by the professor, by myself, who then held the post of "chef de clinique," by the internes and other students, surprised by the unexpected news. The autopsy, held by me with all minuteness, by the two internes and two other distinguished pupils, in the presence of the Baron de Petropolis, revealed nothing that could serve as a pretext, much less a cause, to explain death. Without any doubt, said the learned master to the pupils surrounding him, our patient died of a pernicious paroxysm. Later on a patient near him reported to us that he had complained of being very cold at ten o'clock at night, and had pulled up the blankets to cover himself without uttering another word.

§ XXI.

The diagnosis of a pernicious fever is either very easy, or extremely difficult, When the pernicious paroxysm is immediately preceded by simple intermittent paroxysms; when the physician knows that the patient resides or has been for some time in a marshy locality; when the persons about him can furnish minute and precise information, the diagnosis does not meet with the slightest difficulty. But if the patient be found alone, with intellectual faculties abolished or profoundly disturbed; if the practitioner be ignorant of his residence; if the pernicious attack has surprised him in the enjoyment of perfect health, and if the form assumed by the disease has many or some points of similarity to one of the affections known and classified in the nosological tables, the difficulties with which the physician strives in order to form an exact judgment of the nature of the disease are of such an order that he will often wander from the path of truth unless he calls to his aid all his perspicacity, attention, learning and experience. It is in this difficult and harassing situation that the true practitioner is revealed in all the

fulness of his real worth. He cannot adjourn his decision till later; he cannot wait for one symptom more; he cannot appeal to the further progress of the disease; he cannot set up a symptomatic treatment to cover up his responsibility and ease his conscience.

It is incumbent on him to decide promptly, for any delay may be fatal to the patient; time presses, and must be availed of to the benefit of a life, often precious, which is about to be extinguished and may be disputed to advantage by the use of a certain remedy. This remedy will be administered at once and with due energy if the diagnosis be fixed at once, and the patient may be saved; otherwise it will be set aside, and death will soon count one triumph more.

The diseases are rare of which the treatment is so directly deducible from the diagnosis as in pernicious fever, and they are very rare that show like this, the value of medicine and the scientific importance of the physician. Under the influence of a pernicious attack a patient is to-day at the edge of the tomb; after taking large doses of sulphate of quinine, he rapidly improves, to-morrow considers himself safe, and in a few days regains his former health.

If sometimes the physician cannot decide with certainty whether he has to combat a pernicious fever or another affection independent of malarial poisoning, and in this doubt employs the salts of quinine as a means of prudence and precaution, there are also cases where the diagnostic judgment ought to meet with no difficulty, especially with the practitioner in hot climates, in countries where malarial emanations prevail, or in cities like Rio de Janeiro, where pernicious fevers are so common and assume the most varied forms.

According to some old authors, among them Torti, three signs characterize a pernicious paroxysm: 1st, the condition of the pulse, which expresses the condition of the radical forces of the system; 2d, the condition of the urine; 3d, the paroxysmal succession of the symptoms. In the actual state of practical medicine, these three signs have completely lost the importance assigned them, and we should greatly err in the diagnosis of a pernicious attack, had we no other source of instruction. As every one knows, it is not always that the condition of the pulse betrays the condition of the forces of the animal economy, especially at the beginning of a

disease. Clinical observation protests daily against the exaggerated opinion of Torti, who asserts that the pulse in pernicious fevers is always weak, small and compressible, except in paroxysms of comatose form, when it is bounding, hard and full.

Still less than the state of the pulse can the state of the urine serve as a diagnostic sign of pernicious fever. Even setting aside the cases, very frequent however, where during the pernicious attack there is suppression of the urine, the presence in this fluid of abundant reddish sediment, far from deserving importance, as the ancients thought, has been observed in many acute febrile diseases, especially after the frequency of pulse has ceased, and the temperature has become normal. The amount of sediment is usually in direct proportion to the duration and intensity of the fever. Genuine ashes of organic combustion, the phosphates, urates and chlorides of which the reddish urinary sediment is in great part composed, indicate nothing more than the greater or less degree of interstitial disintegration of tissue during the febrile paroxysm, whatever may have been its nature, simple or pernicious, idiopathic or symptomatic.

As to the third sign of Torti, the periodicity of the phenomena, although it may merit great importance in the diagnosis of a pernicious attack, it is not always present, since, as is generally known, pernicious fever assumes sometimes the remittent, and at other times the continued type.

In difficult cases, given the unfavorable circumstances I have pointed out, the physician, after well examining his patient, will find in him five signs to indicate that it is a pernicious paroxysm. These signs, the first four of which I presented to my pupils in 1867, and which were published, together with a lecture I gave on pernicious fever, in No. 1 of the "*Revista do Atheneo Medico*," are very rarely lacking, at least the majority of them. They are the following:

1st. The rapidity with which the symptoms develop and acquire their maximum intensity.

2d. The singular want of harmony noted in the symptoms, the unusual manner of their grouping, such that they can be referred to no fixed disease.

3d. The gravity of the symptom or symptoms denoting perniciousness.

4th. The rapid enlargement of the liver and sometimes of the spleen as well.

5th. The splenic pain, really a splenalgia, which appears independent of the enlargement of the spleen, and is revealed when the left hypochondrium is compressed beneath the last rib.

The last sign was not appreciated by me until after Dr. Duboue had called the attention of the readers of his book upon malaria to it; it is for this reason that it was not mentioned to the class in 1867, but was later, in 1873. Of all these signs, the 1st, 2d and 4th are the most constant and important; the 5th is often wanting, but when it appears, is also of great value.

Whenever the slightest doubt arises in the physician's mind of the existence of a pernicious paroxysm, he ought to prescribe for the patient a full dose of sulphate of quinine; inasmuch as it is much to be preferred that this drug should be useless, or even a little harmful in case it be not indicated, to the failure of employing it in a case of pernicious fever. On the first hypothesis, no serious inconvenience will be caused by the practitioner's over-caution; in the second, the patient's death will be the result of his neglect. In the benefit obtained in a short time from the salts of quinine, the physician will furthermore find an element of diagnosis not to be despised. Encouraged by these advantages and more assured in his judgment, he will pursue the same treatment, and avoid with the greatest care the recurrence of the paroxysm. If he has ill success, if the progress of the disease convinces him of the uselessness or harmfulness of the treatment he employs, he will always have time to change his course and correct any inconvenience it may have chanced to give rise to.

§ XXII.

Pernicious fever is always a very grave affection; the algid, cardialgic, choleraic, syncopal and comatose forms are those which assume the highest gravity. The greater the number of simple intermittent attacks preceding a pernicious one, the graver becomes this

latter. When, especially, these simple paroxysms have been rebellious to the salts of quinine, we should suspect that the specific treatment will be fruitless to combat the pernicious paroxysm also and to prevent the next attack, which, if at times it fails to be fatal, is always very serious.

The salts of quinine fail to produce the desired effect in cases where the malarial poison has struck deep root in the system; and then we either see simple periodical paroxysms last a long time and only disappear on the patients changing their climate, as is frequently observed; or, if the paroxysms be pernicious, they recur, and the sufferers die in the second or third. The prognosis of pernicious fever should then be so much the graver as the number of paroxysms is larger, the farther the patient is from his first one, and the greater the doses of quinine employed with no benefit.

§ XXIII.

In the treatment of pernicious fever, the physician should attend at once to the basis and to the form of the disease. In presence of a paroxysm, he should employ all the means within his reach to prevent the following paroxysm and to modify its gravity. It is incumbent on him to lose no time and to work vigorously. The patient's life depends on the promptness and energy of the treatment; the smallest delay, and weak medication, are always prejudicial to him.

The only means that can efficiently combat the basis of the disease, are the salts of quinine, given without loss of time and under circumstances to be promptly absorbed. There are cases in which the physician recoils a little to advance further; he resorts to certain preliminary means, which remove the causes generally recognized as obstacles to the absorption of the salts of quinine, and then he employs these salts afterwards.

What has been said in relation to other pyrexias is entirely applicable to pernicious fever. To disengage a very congested viscus, whether it be the brain, lung or liver; to unload the alimentary canal, overcharged with mucus, bile, or alimentary residua; to abate the exaggerated febrile heat; to promote some perspiration when the skin is very hot and dry, are often if not always indications which

should be previously fulfilled, for on this depends the efficiency of the principal treatment, the prompt absorption of the salts of quinine. Still there are cases so urgent, so imminent, which threaten life so nearly, which may terminate fatally in a few hours, that not a moment can be or should be lost.

To give the sulphate of quinine in solution; to give it in doses thrice larger than in a simple fever; to administer these large doses at various hours of the day; not to wait for apyrexia nor any other occasion after fulfilling the preliminary indications, are precepts which I invariably follow in the treatment of pernicious fever, so far as possible. In the gravest cases, where it has been little used, it is best rather to sin by prodigality than by parsimony in the doses of the remedy, for it is impossible to know what is a sufficient dose to combat the miasmatic injection and prevent the next paroxysm. No serious results can come from our prodigality; the gravest symptoms of cinchonism yield in a few days to alcoholics, diffusible stimulants and opium; while on the other hand the patient's death may be the consequence of our parsimony. It is for this reason, that whenever I meet with a case of the highest gravity, I do not hesitate to saturate the patient with sulphate of quinine, even to poison him with this substance, that the therapeutic poisoning, which can be easily cured, may replace in the system the malarial poisoning which may kill in a few hours. Of this mode of procedure of mine, and of the benefits I have obtained with it, some of the cases which figure in this book give very significant proofs. The patient who had an aphasic pernicious attack and who was in the hospital ward in 1867, to whom I have already referred, took in five days 198 grains of sulphate of quinine (11 grammes), without having had any accident, excepting some deafness which lasted hardly a week. At the time of my taking up this case, in a lecture which was published, as already stated, I referred the students to a case in my private practice, where a girl of 9 or 10 years, residing in the Rua do Bom Jardim, attacked by a second comatose pernicious paroxysm, took, during a week, 204 grains of sulphate of quinine in decreasing doses (little less than 12 grammes), deafness resulting which lasted two months.

In my "Annuario de Clinica" of 1868, is reported the case of a patient in the Santa Izabel ward, who, having had three progressively graver comatose pernicious attacks, took in twelve hours a mixture containing 8 grammes of sulphate of quinine. These three patients, who took the largest doses of sulphate of quinine I have ever given, recovered completely; the same happened with the nephew of Drs. Sebastian Saldanha da Gama and Benjamin Ramiz Galvas, the abstract of whose case figures in this work, and should be added to the three I have just spoken of.

I am accustomed to give 2 or 3 grammes of sulphate of quinine in two or three doses, dissolved by means of a few drops of sulphuric acid, leaving three hours interval between these doses. Sometimes I give one gramme of the remedy as soon as the patient is in a condition to absorb it, and order repeated a mixture containing 2 grammes, to be given hourly in tablespoonful doses, so that the mixture shall be exhausted within the space of twelve hours. My aim is to keep the patient's system under the influence of the drug, even after the dynamic action of the first dose has been exhausted. In cases of maximum gravity, where all is anarchy in the animal economy, where we cannot trust much to the activity of the agents of absorption, since all the organic functions tend towards annihilation, I use all the ways of administration of remedies, to give by them the salts of quinine. Injections in the rectum, repeated frictions, the endermic method, even the hypodermic, are made use of by me to saturate the patient with sulphate of quinine. I resort to the valerianate of quinine alone, only under the following circumstances: 1st, when I am convinced that the sulphate is of no avail; 2d, when the paroxysm is accompanied by great prostration of strength, by profound adynamia, revealed by the smallness, softness and concentration of the pulse, by cooling of the extremities, and by weakness of the heart's impulse. Even in this second case, I frequently make use of the sulphate of quinine in combination with alcoholic and diffusible general stimulants, either in the same or distinct prescriptions given alternately at slight intervals. This is my procedure when the pernicious fever assumes the algid, sudoral, choleraic, syncopal and ataxo-adynamic forms.

The formulæ to which I give preference in these cases appear in detail from the observations met with in this volume. I differ in opinion from those who believe it preferable, during an algid paroxysm, to first re-establish calorification, excite the circulation, and thus promote reaction, in order afterwards to resort to the salts of quinine.

Whoever knows the gravity of algid paroxysms, who has been a close observer of the imminent peril threatening the patient during them, cannot be of this opinion.

There is no doubt that the sulphate of quinine in large doses is a great hyposthenic, a powerful depressant of involution; no one disputes that among the grave phenomena of cinchonism figure prostration of strength, cooling of the extremities, profuse diaphoresis, slowness and smallness of the pulse, and weakness of cardiac contraction, faintness, vertigo and even syncope. But it must be considered that in the algid, diaphoretic, choleraic, and syncopal forms, their characteristic symptoms are produced by a malarial poisoning; that the salts of quinine neutralize this poison, that they operate in this case as an antidote, and the cause being removed, its effects should disappear. And moreover, if the sulphate of quinine inspires suspicion to the timid, they may resort to the valerianate; the excitant properties of valerianic acid in the nervous system correct the depressant action of the quinine which plays the part of base in this saline combination. The sulphate of quinine itself, when combined with opium, ether, canella, valerian, the ammoniacal preparations, musk, and alcoholics, does not produce the hyposthenic effects it customarily produces when given alone and in large doses.

As regards the therapeutic means demanded by the form of the pernicious fever, they vary much, as already stated in the beginning of this section. General blood-letting is rarely indicated; even in the paroxysms of comatose and cerebro-meningeal fever, where fluxion within the skull is at times very manifest, phlebotomy should be employed with much reserve and caution. The physician should never be unmindful of the tendency of the system in cases of pernicious fever, to fall into collapse, genuine adynamia. In the older works, especially in those of Audral, Chomel, Rostan and Bouilland,

written under the influence of Broussais's doctrines, we meet with many cases of pernicious fever, then differently defined, in which death occurred a short time after the first or second bleeding. In the highly recommendable work of Dr. Dutroulcau, where malarial diseases are well studied, some cases of pernicious fever with very marked cerebral symptoms figure, in which the lancet gave bad results.

Throughout my professional life I have bled hardly two patients with pernicious fever, and in both cases very successfully; consequently, I do not absolutely proscribe phlebotomy. There are cases where bleeding is the only means of relieving promptly the congestion of an important viscus, the brain or the lung, which during the paroxysm was the seat of a severe congestion which threatened the immediate extinction of the patient's life. If in the supposed case the subject be young, strong, of good constitution; if the pulse be full, hard and bounding, he will certainly find his salvation in the lancet and in quinine; and without the employment of the former, the latter will avail him nothing. But these conditions are seldom present, with us, in practice, and therefore general bleeding should be reserved for very special cases. Almost all the physicians of Rio de Janeiro are of this opinion. The Baron de Lavradio, whose long experience and celebrity give him great authority in questions of malarial practice, declared at a session of the Imperial Academy of Medicine, that he was very suspicious of bleeding a patient with pernicious fever, even when evident signs of severe congestion of the brain were manifest. The same opinion was maintained and followed by the Baron de Petropolis, in the last ten years of his professorship. Professor Dias da Cruz, who has great scientific attainments and an extensive practice, thinks the same.

Local blood-letting, by means of leeches and wet cups, is on the other hand, frequently indicated; it figures in some of the cases published in this book. In the comatose form, in the cerebro-meningeal, delirious, ardent, pneumonic, haemoptoic, the physician often needs to prescribe some leeches to the verge of the anus, in order to unload the meninges, brain or lung. When the pernicious

paroxysm, whatever be its form, excepting the algid group, is accompanied by great congestion of the liver, leeches to the anus and wet cups to the hypochondrium, are of great use. The number of leeches and cups depends upon the patient's conditions of age, temperament, constitution and robustness, on the strength and fulness of the pulse, date of disease, etc. I have observed some cases of pernicious fever in which the sulphate of quinine, of no avail before local blood-letting, after the use of a few leeches, was promptly absorbed, and the patient at once sensibly improved.

Purgative medication, represented by emetics and cathartics, is in the immense majority of cases of pernicious fever of recognized benefit. When the bilious element is mingled with the symptoms of the paroxysm, an emetic of ipecac is frequently the indispensable condition of the efficacy of the salts of quinine. At the beginning of an attack, when the febrile reaction is well-marked, and the tongue denotes derangement of the primæ viæ, I am accustomed to add tartar-emetic to the ipecac, and this combination has given me good results. The saline cathartics, and in certain cases calomel, in the dose of 6 decigrammes to 1 gramme, lend valuable aid at various stages of the disease. Calomel especially, given at the commencement, produces a very prompt salutary effect when there is hyperæmia of the intracranial vessels, as commonly occurs in the comatose, cerebro-meningeal, delirious and ardent forms. Irritant purgative enemata are very beneficial, chiefly in cases where it is impossible to administer remedies by the mouth, either because there is complete and profound coma (carotic or apoplectic form), or on account of uncontrollable trismus or dysphagia.

Diffusible stimulants and alcoholics, to combat alidity in paroxysms of algid form; cerebral depressants, like belladonna, hyoscyamus, and laurel-water, to lower cerebral excitement in paroxysms of cerebro-meningeal, delirious and convulsive form; calmatives and antispasmodics, especially opium and its alkaloids, bromide of potash and chloral, to correct the nervous symptoms noted in paroxysms of neuralgic, tetanic, epileptic and asthmatic forms; anticalorics, such as digitalis, tincture of veratrine, tincture of eucalyptus globulus,

tincture of caferana (*) to lower the very high temperature in the paroxysm of ardent form, and many other therapeutic resources indicated by the various shapes which the paroxysms assume, are the auxiliary means employed by the physicians of Rio de Janeiro in the treatment of pernicious fever, and which lend them indisputable service.

From the reading of the cases figuring in this chapter, it may be deduced that I almost always use blisters to the lower extremities in cases of pernicious fever. In fact, this practice, which I have followed since I began to practice medicine, has given me such good results that I shall probably not abandon it to the end of my life. In paroxysms where the cerebral centers are compromised, the derivative effect of blisters, besides being beneficial, is felt after they are dressed. I wonder that there are Brazilian physicians, to whose practical and scientific mind all render homage, who dispute the immense advantage of this therapeutic method.

The formulæ I am accustomed to employ in the various instances of pernicious fever, as auxiliary to the quinine treatment, appear in the cases, where many of them are found in extenso; therefore I do not repeat them here.

Let me say once again, in finishing this section, the question of the treatment of pernicious fever is one of transcendent importance—is a question of life and death to the patient. The physician, in presence of a patient attacked by a grave paroxysm, has no time to lose; he should strive solely to correct as speedily as possible the intensity of the symptoms constituting the perniciousness, and prevent the appearance of the following paroxysm, or at least modify its gravity; treatment should be prompt and energetic. On this energy and promptitude essentially depends, I repeat, the salvation of the patient confided to our care.

*[Caferana, or Jacaré-urú (*Tachia Gulanensis*), tonic and febrifuge.]

THE REMOTE EFFECTS OF GUNSHOT WOUNDS OF THE EXTREMITIES.

BY LIEUT. COL. C. M. WOODWARD.

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Probably no class of injuries has been productive of more widespread and continued suffering during the past three decades than gunshot wounds of the extremities, whether received from guns of large or small caliber.

The impact, with resultant commotion of nerve structures, is usually so intense, whether the nerves are wounded or not, that paralysis often results. It often happens that the nerve structures are wounded in part or in whole, often torn across, and during the healing process bulbosities, often the cause of disordered enervation and nutrition, and cicatrical tissues form in the track of a missile, which may lead to a direct and continuous pressure upon nerve structures by the formation of cicatrical bands and callosities, which must sadly interfere with nerve function and nutrition beyond the point of injury, or impact, leading not only to the production of pain more or less severe and continuous, but also to the development of diseases of a more serious nature, resultant from the disordered nutrition and constant irritation produced either by wound of the nerves or the presence of a bullet or other missile still remaining in the tissues near the site of a nerve.

Paralysis, and especially paralysis of a reflex character, is perhaps one of the most frequent results of shot wounds of the extremities. There are on record many cases of paralysis resulting from this cause, and there has occurred in the practice of the writer within past years, cases of still more serious import, that in some have finally resulted in the necessity for amputation even as late as from fifteen to twenty-five years after the receipt of the wound, and resulting sometimes in death, itself.

Case 1.—J. D. was wounded at Fredericksburg, December 13th, 1862; he was marching at double quick, when a fragment of shell

as large as a musket ball struck his right thigh at the junction of the upper and middle thirds, directly over the femoral artery. The fragment did not enter deeply, merely lodging in the leg, and was removed a day later without injury to the vessel. He fell half-conscious, and although aware that he was wounded, he could not fix on the site of the injury until he had examined his leg. He felt instantly a burning pain in both feet, in the front of the right chest, in the right arm and in the right thigh, about the wound. At first he was entirely powerless, but in a short time the power of the left arm returned, leaving him paralyzed as to motion in the right arm and both legs. He lay on the field twenty-four hours; the weather being very cold, sensation was defective in all the parts paralyzed as to motion. He had no pain in the back, but the burning pains, before alluded to, continued for a long time. While the wound was healing he had headache and difficult, painful micturition. The wound closed in four weeks. During this period he regained the power to move the right arm feebly and slowly, although perfectly as to extent. The pain in the side and feet also disappeared. He could not stand, however, or lift his feet or legs from the bed at the time the wound healed, but there was then no headache or difficulty with the bladder or rectum. January 28th, 1863, he was sent to this city (Washington), where he improved so much as to be able to walk with a cane. However, on being transported to a hospital in a distant city he suffered a relapse, the pains returned, the paralysis increased and he walked with difficulty on crutches. This patient remained partially paralyzed for a number of years. He had some power to move the thighs when lying down, but could not lift his legs from the bed. Below the knee all motion was lost, except a slight power of flexing the smaller toes in both feet. Pressure upon the cicatrix causes feeble twitching of the anterior muscles of the right thigh; both legs are subject to cramps and twichings, which increase at night. Both legs became somewhat wasted, and below the knees were relaxed and cold, and the feet were congested. He improved for a time under treatment by strychnia and electricity (Faradization), but finally ceased to improve, and treatment was abandoned; the burning pains in the feet continued to some extent.

The tactile sense became feeble in the right leg and arm, but was nowhere entirely lost.

Case 2.—W. A., private, was wounded July 1st, 1863, at Gettysburg. While kneeling on the left knee, the right knee bent at a right angle, he was shot in the right thigh on a line with the internal condyle of the femur, ten inches above it and a little anterior to the artery. The ball passed upwards, backward and outward and emerged two inches below the tuber ischii, and one and a quarter inches external to it, just above the nates. Dropping his musket, he fell on his face, weak but not insensible, the right leg violently flexed for a moment; he felt very feeble but especially so in the right arm, with which he vainly tried to aid himself. After a half hour the bleeding, which was not excessive, ceased, and he was able to stand on his left leg, but not on the right, and had scarcely any use of the right arm, which was in no way hurt when he fell. He managed to bind up the wound with a water dressing, and occasionally renewing it, he laid two days on the field. When hit he perceived no pain, but within an hour a burning attacked his instep and never left it, remaining neither worse nor better. After the wound healed he improved slowly for a time. As he could not walk without aid, a crutch was used. The leg below the knee wasted, the foot was swollen, the toes blue, and there was a contraction of the great toe inflexion, although the wound had entirely healed. The tactile sense was absent in the sole of the right foot, feeble in the second toe on its dorsal face and absent on top of the third toe, but elsewhere complete. Localization extremely confused so that a touch on the toe is felt, but is referred to the instep. The pain which is suffered lies deep in the calf and extends outside, under and in the peroneal muscles, down the front of the leg, and over the dorsum of the foot and to the external side. It is intense in the dorsum and nearly absent in the sole. The pain is of a burning character. Heretofore no treatment seemed to be of any avail, although blisters applied over the seat of the pain gave the greatest relief, and the use of electricity was apparently of some value.

Case 3.—Michael H., a private, was wounded in the left thigh, about the junction of the middle with the upper third on its external aspect, by a minnie bullet, at the battle of Antietam. He fell flat on

his face, but when found on the field, had rolled over on his right side. There was never much hemorrhage. He was taken to the hospital and search was made for the bullet, which was unsuccessful, although no point of exit could be found. The missile had left its track of entrance. In this case, as in others, there was for a time the same kind of burning pain, but which, however, soon subsided; the wounds healed and the patient apparently recovered and left the hospital.

At the close of the war he returned home and was employed as a teamster. At the end of ten years he consulted the writer for a large swelling, which during the two years previous had gradually developed at the knee of the wounded side, at which time the swelling had attained the size of a man's head. The leg was flexed at the knee at an obtuse angle and locomotion was greatly impeded. On being questioned, the patient stated that he had been wounded in the manner before described and that the bullet was never found. At the time of this examination a very small opening existed over the internal condyle of the femur, which would admit a Hamilton's bullet probe. The probe passed readily upwards between the sheaths of the rectus femoris, vastus internus and adductor longus muscles at about the point where they are crossed by the sartorius. At this point the probe seemed to meet with an obstruction. It was believed that the bullet was lodged at this point. At the request of the writer, a day was set for an operation for the removal of the ball, or an exploratory incision to determine more fully if the bullet was yet in the tissues. On again introducing the probe up to the point of obstruction, and an incision being made directly downward at this point, a full-sized minnie bullet was cut across and removed from its bed without difficulty. It was found from the marks and furrows upon the missile that it had struck the femur and glanced upward again into the muscles, where it had lodged and had become encased in a provisional callous. As time passed it had finally, at the point of its sharp edges made by striking the femur, ulcerated through this callous and had irritated the soft structures to such a degree that the discharge was produced, which sacculated at the knee. After the removal of the bullet and the wound dressed, the collection at the

knee was evacuated, and the cavity washed out with a mild antiseptic solution. This case proceeded steadily to a complete recovery and perfect use of the leg. No paralysis occurred in this case. The bullet, striking the thigh from its outer aspect, did not apparently produce sufficient commotion in the sciatic or other nerve structures and the femur was not fractured by the shot.

Case 4.—The following incident occurred to Silas A. of the 104th New York Volunteers, while engaged in action with his regiment on the second day of the Battle of Gettysburg. This regiment was then in line of fire behind a barricade of rails, when one or two regiments of Confederate Infantry were seen to emerge from a piece of woods and march across a field directly towards the position occupied by the 104th New York. The Confederates had tied white handkerchiefs and strips of white cloth to their bayonets and ramrods, and the Volunteers thinking this demonstration a token of surrender, marched out a short distance from their barricade with unfixed bayonets to receive them. When the Confederate line had advanced to within about two hundred yards they suddenly, contrary to all the rules of civilized warfare, opened fire on the Union troops. The Volunteers, with the rest of the brigade to which they were attached, retreated to their barricade of rails, leaving their dead and wounded where the first onslaught was made. At this time Silas A. became separated from his command, from the fact that he did not retreat with his comrades, but remained to have a few parting shots, or "fight it out alone on that line." At this time, having just discharged his piece, his quick eye discovered a Confederate, who also was just beginning to load his rifle hurriedly, evidently having selected Silas A. as his next opponent. There was now a strife between the two men, Confederate and Federal, as to which one should finish loading first. In the hurry and excitement Silas A. dropped his ramrod, recovering which consumed a little time, allowing the Confederate to deliver his fire a second in advance of his adversary, and although Silas discharged his piece, he said it was while he was turning a complete somersault. The Confederate bullet took effect as Silas A. was standing at the position of aim; the ball passed through the left thigh first, making a slight flesh wound, and striking the right thigh, it just missed the

femoral vessels and nerves and passed through, striking the femur slightly, but did not fracture it. He was now "hors de combat," was captured by the Confederates and placed in their field hospital, from which he was exchanged four days later. During his four days in the Confederate hospital not a mouthful of food was given him and his wounds were not dressed. On coming into the hands of our own surgeons, an amputation of the leg was advised and urged, but steadfastly refused by the patient. He was treated in the hospital until his wounds healed, and at the close of the war returned home, and for about fifteen years he enjoyed fair health, except at times he suffered with burning pain down the right thigh and anterior portion of the leg. At about this time the great toe began to swell. This swelling



would at times recede, and then swell again, until finally it remained permanently swollen and became very painful, after a year or two of this suffering, which began to be extreme in 1884, twenty-one years after the receipt of the wound. By the summer of 1886 the great toe, which had previously remained swollen, began to turn blue and finally after a few months it became truly gangrenous; an amputation of this member was made by a local surgeon, but the stump never perfectly healed. In the course of another year the end of the foot including all the toes, became gangrenous, and an amputation at the middle of the foot was performed at the University of Michigan Medical Department, by the then Professor of Surgery. This stump never healed, but remained more or less open, and in it the patient still suffered much pain.

On August 9th, 1888, the writer was consulted by this patient as to his condition and prospect of receiving any benefit from treatment. The stump was at this time smelling badly and had the appearance of a scirrhus or hard cancer. The patient was advised that an amputation made well above the ankle was the only immediate means of relief, while possibly not of a permanent nature, at least such for a time. Acquiescing in this advice, the patient was immediately placed on a tonic and alterative course of treatment and hygiene and the 19th day of September, 1888, was fixed upon as the time for the operation. This was performed by the writer at the time appointed. The stump healed kindly and rapidly and was perfectly well in twenty-one days and the patient able to be about. In about



one month from this time a small swelling appeared in the right groin, which increased in size so rapidly that it soon became as large as a man's head, and was looked upon as being probably a sarcoma, and from its rapid growth was thought to be of the round celled variety, maintaining its position and great size until the last of November following, when it began to decrease in size. At the same time a tumor of apparently the same character began to develop behind the right ear, which remained for a few days and then disappeared in twenty-four hours. Immediately symptoms of compression of the brain supervened and death resulted in a few hours. Thus ended one of the most interesting cases that has occurred in the practice of the writer since the war. Through the kindness of the Curator of the Army Medical Museum, it is my pleasure to present for your inspection the specimen of the amputated foot and leg of



the patient, whose case has just been detailed, showing the condition of the foot at the time of amputation on September 19th, 1888, twenty-five years after the wound in the thigh was received. To report all cases illustrating the remote effects of gunshot wounds of the extremities would make a work too voluminous; a few typical cases therefore, must suffice.

We are forcibly reminded that in two of these cases several years intervened between the healing of the primary wounds and the

appearance of the remote symptoms, which led on to a worse condition and even to death itself.

In some cases of gunshot wounds, involving as they do the nerves in various ways, paralysis of motion or sensation, or both, may result in some part of the body more or less remote from the seat of the injury and the time of its occurrence. How can this be explained? Although it has long been known that certain forms of disease are capable of causing paralysis of distant organs, of altering secretions and affecting nutrition, we have had no plausible theory of the causation of these effects by traumatism, unless we recall the fact that the irritation of the vaso motor nerves are capable of producing contraction of the blood vessels and so alter nutrition. It is inferred that when an external nerve is violently or permanently excited by disease or traumatism, it may be able to produce contraction of the capillary vessels of the nerve centers and thus give rise to paralysis, while it is also possible that the alteration of the nutrition, which this temporary anaemia causes, may result in a continued disturbance of function and nutrition, which, however slight, may bring about the more serious developments mentioned in the case last reported, and the specimen from which you will be given the opportunity to examine. As the use of the Krag-Jorgensen and other small-bore rifles are still in an experimental period, we can not know what the remote effects produced by these guns and the jacketed bullet may be, but it is hoped that while they are sufficient to place the enemy "hors de combat" and win the victory, they will not entail the great amount of prolonged suffering that is often produced by the old leaden bullet from guns of larger calibre.

THE ANTISEPTIC TREATMENT OF WOUNDS OF THE LIVER, WITH REPORT OF A CASE.

BY CAPTAIN GEO. E. BUSHNELL,

Assistant Surgeon U. S. Army.

On April 13th, 1892, a party of invading "regulators" who had been besieged for three days at a ranch by the people of the vicinity, surrendered to the United States forces of Fort McKinney, Wyo. After the surrender one of the besieged was found to be suffering from a gunshot wound. A few hours before this man, being on his knees, was reaching out with one hand from behind the extemporized fortifications to pick up an object which lay on the ground exposed to the fire of the besiegers. While in this position his loaded revolver, a 45-calibre Colt, slipped out of its holster and the hammer striking on the ground the revolver was discharged. The ball pierced the heavy canvas overcoat which he wore and entered the lower part of the right side of the thorax, passing through the cartilage of the seventh rib. There was at first profuse bleeding. No medical officer being with the command, several hours elapsed before Lieutenant H. A. Shaw, Assistant Surgeon, arrived, by which time the hemorrhage ceased. Dr. Shaw applied antiseptic dressings to the wound, and returned to the post, with the patient in a hospital ambulance. The patient arrived at the post hospital at about 9 p. m., where I saw him. He appeared to be in excellent condition, notwithstanding the ride of seven miles over a rough road. He complained of but little pain in the abdomen, but stated that his feet, especially the left, tingled—a symptom thought to be due to the impingement of the ball upon the vertebral column. There was, however, no external evidence of injury to the latter. It was decided that no operative interference was necessary, and the carefully applied dressings were not disturbed. During the following three days the patient's condition continued to be good. The abdominal pain was slight, the tingling in the feet disappeared and the temperature was but slightly elevated.

But on April 16th a large quantity of straw colored serum suddenly burst out of the wound, completely saturating the dressings and the patient's clothing. The dressings were changed but were again speedily wetted. The danger of infection of the wound was recognized. Large quantities of dressings were sterilized by steam and the wound was dressed with all antiseptic precautions twice a day. Each morning, however, the discharge was found to have soaked through the dressings in large amounts. In a few days the discharge became turbid and soon frankly purulent. It was then noticed to be of two colors, the one the yellow of ordinary pus, the other a brownish yellow as if mingled with bile or liver cells. On April 27th, a bit of cartilage from the wounded rib presented in the wound and was removed. The patient's temperature continued to be nearly normal, but he became steadily weaker and more emaciated and finally died of exhaustion and septic poisoning on May 12th. Autopsy May 13th. A wound of right side of thorax over the cartilage of the seventh rib, close to its junction with the bony portion of the rib. The ball had punched out a disk comprising the upper two-thirds of the width of the cartilage. Extending downward from the wound was a flattened, circular sac, about six inches in diameter, between the abdominal wall and the anterior surface of the liver, formed by firm adhesions. The anterior orifice of the liver wound was found within this sac four inches below the wound of the thoracic parietes. Entering the right lobe of the liver at a point two inches above its anterior border and four inches to the right of the round ligament the bullet had passed downward, backward and slightly inward, and had emerged on the under surface of the liver at a point two inches behind the anterior border and one inch to the right of the gall-bladder. The greater part of the right lobe was in a state of inflammatory softening. The ball was imbedded in the right lateral surface of the body of the first lumbar vertebra, which was carious. A localized adhesive pleurisy of the base of the left lung was present, the cause of which was not apparent. Otherwise the autopsy presented no points of especial interest.

It is evident that at the time of the reception of the injury, owing to the posture of the patient, which was probably nearly the knee-

chest position, and perhaps also to a deep expiration, the liver was elevated above its usual position of rest. The patient afterward lying upon his back, the liver settled down into the position in which it was found at the autopsy. The lack of correspondence of the external and internal wound-tracks led to an intra-peritoneal effusion, which was quickly limited by adhesions. It is instructive to note that these adhesions became sufficiently firm in three days to resist the pressure of the large amount of serum which had by that time collected. Taking into consideration the injury to the vertebra there is little doubt that the wound would have proved fatal under any treatment after it had become septic. But if the true condition had been apprehended at the time of the first outburst of serum, and if the sac had been opened under antiseptic precautions and properly drained, the outcome of the case might have been very different.

The liver is more influenced by respiratory movements than the other abdominal organs on account of the position of its convex surface within the dome of the diaphragm. From its position of rest, i. e., that occupied at the close of passive expiration, according to Sibson (*Allen's Anatomy*, p. 670), "it descends and advances nearly two inches in deep inspiration." The lower ribs and cartilage at the same time ascending and advancing, the downward movement of the liver in relation to the ribs amounts to about three inches. In forced expiration the reverse movements take place and the liver is elevated above its position of rest. A few experiments in percussion, the subjects being in the knee-chest position, have shown an ascent of liver dullness in the axillary line during expiration varying from one to two inches. Besides these variations in the position of the organ the liver suffers a change of shape during respiration. During a deep inspiration, according to Sibson (*Allen's Anatomy*, p. 666), it is compressed and shortened from above downward and widened from side to side. Conversely, on forced expiration, the liver, compressed by the lower ribs, would be lengthened from above downward and narrowed from side to side. According to Symington (*N. Y. Journal*, Vol. XLVIII., p. 135), its transverse diameter is diminished and its vertical extent on the right side increased by distention of the stomach, and

at the same time it undergoes a rotation around a vertical axis, passing through the inferior vena cava, the left and the anterior part of the right lobe being most displaced. A distention of the stomach and of the colon may also tilt the anterior surface of the liver upward and backward. The anterior surface of the liver is generally in apposition with the abdominal wall in the recumbent position. When the subject stands the anterior edge recedes. It is thought that this change of position would be further increased by bending the body forward. Such partial rotations around a horizontal as well as a vertical axis might increase in certain cases the separation of the external and the internal wound track. A consideration of these facts leads to the conclusion that in the case of a wound to so plastic and movable an organ there is a considerable probability that after the patient assumes the recumbent position the wound of the liver will no longer exactly correspond with that of the parietes, and that thus the formation of an abdominal effusion will be favored.

Wounds of the liver are best treated by laparotomy, with suture in the case of incised, and plugging with gauze in the case of gunshot wounds, provided that the patient can be treated in hospital under favorable conditions. In the surgery of the battlefield, however, laparotomy can rarely be performed. The dangers of a hasty operation amid unfavorable surroundings would generally outweigh the probable benefits, and the operation will probably be restricted to exceptional cases seen soon after the reception of the injury, where death is threatened from primary hemorrhage. The patient having survived the first dangers of shock and hemorrhage, the prime indication is to maintain the wound aseptic. It should of course be dressed with all possible antiseptic precautions and not explored. The insertion of a drainage tube at the first dressing increases so much the danger of the infection of the wound that in my opinion it will generally be best to omit it. Liver wounds always bleed freely. There is probably always an escape of bile, varying from amounts too small to be detected in the flow of blood to large quantities when a bile duct is wounded. Cases are on record where an autopsy showed that there had been absolutely no escape of blood into the abdominal cavity (N. Y. Med. Record, Vol. XXXII., p. 86). It is probable, how-

ever, that some blood is effused in the majority of cases. The irritating properties of the bile with which it is mixed quickly excite localized peritonitis and adhesions encyst the effusion, which if small may be absorbed, if larger in amount or if accessions to it are received from continued leakage of the liver wound, it accumulates and finally bursts through the wound. One case is recorded where the very small external wound healed and a secondary laparotomy was necessary in order to evacuate the large effusion. (Boston Med. and Surg. Journal, Vol. CXXVI., p. 416.) The repair of an aseptic liver wound may be rapid. In one case an autopsy two weeks after the injury discovered the complete cicatrization of a bullet track through the left lobe of the liver. (N. Y. Med. Record, Vol. XXXII., p. 416.) Infected wounds heal if recovery takes place at all only after a protracted course of suppuration. Localized hepatitis occurs about the wound with softening and the discharge of a detritus consisting of broken down liver cells and stroma, and sometimes of lumps of liver substance. The sloughing occasionally leads to the opening of bile ducts, followed by profuse discharge of bile. Among the numerous cases of liver wounds recorded in the Medical and Surgical History of the War of the Rebellion, and in the publications of the Surgeon General's Office, are many in which it is noted that a profuse discharge from the wound suddenly occurred a week or more after the injury. This was no doubt due in a majority of cases to the exposure of bile ducts in the course of the sloughing process, but in some cases it is expressly stated that the bile was mixed with an offensive sero-purulent fluid (Med. and Surg. Hist. of the War of Rebellion, Vol. II., p. 142, case 333), or that the color of the discharge was green and that this was mingled with thick yellowish matter (Med. and Surg. Hist. of the War of Rebellion, Vol. II., p. 146, case 396), or that the discharge was of bile and serum (Circ. No. 3. S. G. O., 1871, p. 49, case CLVI.) It appears highly probable, although from the absence of details it must remain simply a probability, that in some of these cases the mixed character of the discharge was due to the presence of a peritoneal sac such as was met with in my case.

Gunshot wounds of the liver will offer a better prognosis in future wars than in the past on account of the smallness of the projectiles, which will diminish the danger of fatal hemorrhage. Captain La Garde remarks in his report to the Surgeon General: "The smaller frontage of the hard-manteled projectiles causes them to inflict something after the manner of a sub-cutaneous wound, when the soft parts are alone traversed and the small wounds of entrance and exit and the narrow track of the missiles are favorable circumstances to rapid healing" (Report of the Surg. Gen'l to the Secy. of War, 1893, p. 94). But the smallness of the external wound and the rapidity of its healing will also tend to imprison the effusions in the case of liver wounds. The practical point which I wish to make is especially this, that in case of liver wounds which have not been subjected to primary laparotomy, particularly cases in which there is reason to suppose from the position of the patient when the injury was inflicted that the external and internal wound-tracks do not correspond, or cases in which there occurs a sudden discharge of serum or of serum and bile from the wound, the abdomen in the vicinity of the wound should be carefully examined and if there is evidence of intra-peritoneal effusion a secondary laparotomy should be performed and the cavity drained at its most dependent portion.

SOME OBSERVATIONS ON THE ORGANIZATION AND EFFICIENCY OF THE HOSPITAL CORPS AND THE WORK OF THE MEDICAL CORPS IN TIME OF WAR.

By CAPTAIN JUNIUS L. POWELL,

Medical Department U. S. Army.

The act approved March 1st, 1887, entitled "An Act to Organize the Hospital Corps of the Army of the United States," was a radical departure from ancient and obsolete methods, and like every other innovation upon old and accepted usage, has had to pass through various stages of experimentation and evolution before being perfected in all the details essential to efficiency and successful operation. While it is true that there are some points still sub judice, points upon which there is a pronounced diversity of opinion, it is

believed that the wisdom of the measure is now universally conceded. It is curious, however, when we reflect that while the necessity for such an organization existed and was recognized by many during the War of the Rebellion, when the widest field was open for a demonstration of the practical advantages to be derived from the creation on a permanent and independent basis of a corps trained to care for the wounded on the field of battle, it was not until more than a quarter of a century after the curtain had been drawn down over that great drama in the history of our country, that the ideas and recommendations of the men who then agitated the subject, were permitted to take shape and materialize. To the great breadth of mind, originality and executive talent of Dr. Jonathan Letterman, Medical Director of the Army of the Potomac, are we indebted for the prototype in the scheme which has assumed definite and permanent shape, by virtue of recent legislation, for it appears that, prior to his time, there were no precedents or models that had proved satisfactory upon which he could rely for suggestions in formulating measures adapted to meet the exigencies by which the Medical Department was confronted. Legouest, a French military surgeon of experience, in a work entitled "*Chirurgie de l'Armee*," and published during the progress of our civil war, feeling the embarrassments incident to the want of an organized force equipped and trained to care for the wounded on the field, expresses himself in the following language, viz.:

"The removal of the wounded from the battlefield and their transportation to the hospital, is the most defective part of the medical service. Even now, after the great wars of the end of the last century and the beginning of the present, after the bloody battles of our own times, this important service (in the French army) is delegated to no particular person, or rather no one has been given authority or placed in position to render it. Military surgeons who have been present in various engagements all know that when the wounded fall in the ranks there are none, as a matter of fact, to carry them off, except their own comrades, a service as painful to one as to the other; the soldier quits the ranks, often never to return, or only after the fight is over; the number of men carrying off their com-

rades is rarely limited to the number really necessary, and one may sometimes see four, five, or even six soldiers conducting to a hospital a man slightly wounded and marching quite as well as his comrades."

Even Larrey and Des Gennettes, surgeons under Bonaparte, out of their vast experience, failed to leave behind them any suggestion of a system by which the evils pointed out might be corrected. Letterman's Ambulance Corps was a new departure, but the war had been in progress for more than a year before its originator was placed in a position and clothed with authority essential to the accomplishment of the grand results that followed upon its inception. Nevertheless, there was built for it and its founder during the comparatively brief period of their service, in the magnitude and value of the work they rendered by strengthening the hands of the General commanding in trying moments, and giving to thousands of sick and wounded prompt and efficient aid during their sufferings, a monument to their memory that will endure as long as brilliant achievements and devotion and courage in the performance of duty continue to elicit the applause of men.

What has been said but emphasizes the idea which might well be accepted as axiomatic, that organization, discipline and efficiency constitute a tripod of co-ordinate and mutually dependent conditions, upon which any military ideal must be built and ultimately stand. No man ever understood this better than Letterman. The order published from Headquarters Army of the Potomac on August 2d, 1862, framed by himself and embodying the details by which were to be carried into effect the conceptions of his gifted mind, is a model of simplicity, conciseness and directness. A distinguished French Surgeon, De Salt, I believe it was, once sagely observed that the simplicity of an operation was the measure of its perfection. The truth of this utterance is applicable, not alone to the domain of surgery, but to every device or invention, great or small, born of man's ingenuity, and Letterman was the very embodiment of the principle in point. He saw and knew only essentials in meeting the exigencies of battle, and he applied them in the simplest and shortest manner. The drill that he instituted did not go beyond "instructing his men

in the most easy and expeditious method of putting men in and taking them out of the ambulance: taking men from the ground, placing and carrying them on stretchers, observing that the front man steps off with the left foot and rear man with the right, etc." This was all, but it proved equal to every demand upon the stretcher bearers in time of action, and was continued without modification to the end. In contrast with this are the multifarious detachment evolutions with which our most recent manual of drill for the Hospital Corps is replete, the application of which to any of the exigencies of a great battle, the only true test of their value, is to the writer's mind exceedingly problematical. Their execution leaves upon the imagination an impression as barren in tangible results as were the claims of the Kentucky gentleman at one of the Bourbon State fairs, who desired the committee awarding prizes to see his horse early. He was asked to bring him out on the turf. One of the committee asked him if he could trot. He shook his head and said no. Another member of the committee asked him if he could run. Again he replied, no. The third and last member of the committee wanted to know if he was good under the saddle. He replied: "Saddle, hell: he's just for show."

EFFICIENCY.

The efficiency of a military organization is so inseparably linked with its equipment, that any discussion of the one without the other would be essentially incomplete. The *raison-d'être*, in the latter case, is determined by the nature of the duties to be performed.

The Medical Department and Hospital Corps are not combatant in their functions. Their office is to save life and not to kill. They are, however, none the less military in character.

During the prevalence of war between civilized nations according to the spirit and letter of the Geneva Convention, as expressed in Articles 2 and 7, their neutrality and privileged status, in view of the work of humanity in which they are engaged, is assured and proclaimed by the emblem of the Red Cross which is worn on the left arm. Equip them as combatants and remove the Red Cross and they cease to enjoy the protection conferred by international agree-

ment. They must fill the roll of the Good Samaritan or the warrior—they cannot do both. The Hospital Steward, U. S. Army, under existing regulations, is required to wear a ponderous cavalry sabre. The incongruity of his make up, as the Red Cross on his left sleeve declares his calling, while his clumsy "Toledo trusty" dangles from his left hip, is suggestive of those unclassified genera that have vexed the science of naturalists. Since then it does not appear that there is any object in view the attainment of which would be in any way equivalent to the discomfort and embarrassment to freedom of movement which the aforesaid equipment inevitably entails, it must necessarily be classed among the impedimenta, and to that extent impair the capacity of the sanitary soldier in the proper performance of his duties.

COMPANY BEARERS.

The duties of the bearers are of a cognate character, to those of the members of the Hospital Corps, but the scope of these duties and their limitations do not appear to be as distinctly stated as they should be. True, paragraph 1375 of the Regulations provides that "during an engagement the company bearers shall, under orders of their commanding officers, give first aid to the wounded or carry them to the rear, until relieved by members of the Hospital Corps," and on this same subject, it is the decision of the Surgeon General, rendered June 13, 1891, that each bearer, in addition to his fighting outfit, should be equipped with "a field tourniquet and a package of dressings." But an engagement may last a whole day, and the severer the fighting, the greater the work for the Hospital Corps and necessity for the presence on the fighting line of every combatant unit. By taking four men from each company, forty would thus be withdrawn from each regiment, and the results for either side, in the conflict, often hang upon the presence or absence of a smaller force than this. What officer then, while fully sensible of the demands that humanity makes upon him, in behalf of his wounded comrades, would assume the responsibility of reducing the fighting strength of his command, to that extent, even for the briefest period, in the face of possibilities of such momentous import? I believe that to carry out all the fore-

going provisions would be putting impediments in the way of the performance of their paramount duties, by the company bearers, for which there could be no possible equivalent in the benefit that would accrue to the wounded. I am of the opinion, therefore, that the office of the bearers, in their service to the wounded during an engagement, should be limited to emergencies in their strictest sense, and that under no circumstances should they be ordered or permitted to leave the line of combat. The first aid equipment, viz.: A field tourniquet and a small package of dressings, as prescribed by the Surgeon General, suggests the limits of their ability to render first aid, and in order to avert impending death, this can be applied with such dexterity and speed as to admit of the bearers retaining close touch with the fighting line. The wounded man should then be left as comfortable as he can be made, to await the approach of the members of the Hospital Corps, who should be close at hand, with the stretchers, to remove him to the first dressing station. When the combat is at an end, or there is a lull in the conflict that will justify it, then the bearers may be used as auxiliaries to the Hospital Corps in taking the disabled to the rear, and to this end, the latter organization should go upon the field equipped with a sufficient number of supernumerary litters to meet the demand.

The points that I have just brought out have not, so far as I know, elicited discussion, but their importance, to my mind, cannot be overestimated. In the drama of war, that organization is the most perfect and is most easily and effectively handled that has all of its members well versed in the nature and extent of their duties, and these latter cannot be too clearly and distinctly formulated to insure rapid, intelligent and efficient execution.

To us has been given the organization. How best to use it, it is needless to say, to compass the greatest good to an army in the field, is the province of the Military Surgeon.

Finally, a word on what has been accomplished in the past one or two decades in the domain of surgery to relieve future records of the appalling accumulation of fatal results. Limiting these remarks, for example, to the treatment of compound fractures alone,

of which gunshot wounds, inflicted during the time of war, constitute such a vast proportion, the statistics of the present day show such a marvelous decrease in the mortality over past experience, as to demand careful attention. "In Guy's Hospital from 1841 to 1861, twenty years, there was a mortality of about 28 per cent; in the Pennsylvania Hospital from 1839 to 1851, twelve years, there was a mortality of 44 per cent; in the New York Hospital, during a similar period, there was a mortality of 48 per cent; in the Upchow Hospital Report of St. Petersburg, there was a mortality of 68 per cent." Under modern methods, Dennis* reports 681 cases of compound fractures with one death from sepsis, giving a death rate of one-seventh of one per cent. Coming now to the field of Military Surgery with its many conditions unfavorable to the wounded, I cite Dr. C. R. Reyher, who, as far back as 1878, reports among the casualties of the Russo-Turkish War a list of 28 cases of wounded knee in which the bullet was driven into the parts. The mortality of these was 16.6 per cent. In eighteen of them neither primary nor secondary amputation was performed, and fifteen recovered, not only without loss of limb, but with motion in the joint. Bergmann also got remarkable results. He had fifteen cases of gunshot wounds of the knee joint, after the storming of Telisch and Gorni-Dubnik. Of these fourteen recovered, two after amputation, and one died. Compare this with the consensus of opinion that prevailed among surgeons of repute, in the early part of the century, and even down to a later date, as regards penetrating wounds of the knee joint. Guthrie and Larrey in the French Wars, Esmarch and Stroy Meyer in the Schleswig-Holstein campaign, and the surgeons in the Crimea, all found that the attempt to save the limb so injured led to the sacrifice of the patient's life.

Naturally, the foregoing brief comparison of statistics engenders a feeling of pride, and while there have been and may still be some who would begrudge the Military Surgeon the official rank and prerogatives to which the nature and value of his services would more than give him a claim, he can nevertheless go forth in response to the tocsin of war for the great and important work that the future prom-

*Medical News, April 19, 1890. p. 416.

ises for him, conscious of the fact, that in the march and progress of his calling, he is well abreast of the age, and that as a factor in contributing to the grandeur and glory of his country's deeds, he is the peer of any.

THE FORMATION, CHARACTER AND WORK OF SCHOOLS FOR MEDICAL OFFICERS IN THE VOL- UNTEER MILITIA OR NATIONAL GUARDS.

BY BRIGADIER GENERAL HERBERT L. BURRELL,

Surgeon General of Massachusetts.

Colonel Alden has suggested that it might be of interest to the Association to learn the experience of Massachusetts in the work of the schools of officers.

A paragraph in Section 113 of our Militia Law, 1893, states that "at the discretion of the Commander in Chief, a school for officers may be established in any portion of the State, under such rules and regulations as he may deem proper."

Under this law, schools are directed to assemble by an order from the Adjutant General's office, and the Adjutant General designates the officer who shall preside. To the presiding officer is left the selection of readers or the character of the work which shall be carried out in the schools. Subjects are assigned to individual officers, who present them to the school in the form of papers or demonstrations, and at times conclusions are formulated which exert a powerful influence. Mileage is paid to the officers attending these schools.

The honor of holding the first school for officers was given to the Medical Department, and it was held March 14, 1894. One other school for medical officers has since been held, and the following subjects have been considered: 1st. The duties of medical officers; 2d. A discussion on establishing an emergency ration; 3d. The examination of recruits from the paymaster's point of view and from the medical officer's point of view; 4th. A demonstration of forms, blanks and books, constituting a paper on "Red Tape."

We have just started these schools—in fact, only two have been held; but the following measures have been adopted as a result of the work done in the schools.

1st. The establishment of an emergency ration, composed of, for a company of 60 men:

“Hard tack, 60 pounds; average per man, 1 pound.

Luncheon or corned beef, 60 pounds, average per man, 1 pound.

Coffee, $11\frac{1}{4}$ pounds; average per man, 3 ounces.

Sugar, 18 pounds; average per man, 4 ounces.”

“The troops, when ordered in emergency by the Commander in Chief, are to be instructed in such order to provide themselves with one or more emergency rations. Bills for the payment of the same will be forwarded to the Quartermaster General for payment.”

It was the Surgeon General's desire that the emergency ration should be kept stored in the armories of the different organizations; and it has been found that some of the commanding officers have already had sufficient foresight to provide their commands with the ration.

2d. It has shown the necessity of a system of forms, blanks and books for the proper conduct of the Medical Department of the Volunteer Militia, that the officers might be properly instructed in their use.

3d. It has placed in the hands of the Surgeon General the subject of the physical examination of recruits in such a form that this necessary reform will soon be made mandatory.

So much for what the schools have done for the service in Massachusetts in less than eight weeks.

The following are some of the advantages of schools for officers:

1st. They establish a close acquaintanceship between officers serving in the same department.

2d. They familiarize the older officers and instruct the younger officers in the duties of their positions.

3d. They give an opportunity for men who are interested in the service to present new ideas, to have them freely discussed, to reach definite opinions, and in many instances to make needed reforms.

It is obvious that in schools for officers the foundation of military-medical work should first be mastered and it is the intention of the Surgeon General to arrange for the instruction of officers when they enter the service. The plan is after they have passed their professional examination before a board of medical officers they would be directed to appear before a board of instruction of medical officers. This board would instruct them in such matters as are necessary for them to know in the military service of the State. When this Board of Instruction reports to the Board of Medical Officers that the officer is qualified, he would then pass.

The character of instruction to be carried out in this primary school—if you like—would be: The school of the soldier and that of an officer (so much as is necessary for a medical officer to know); horsemanship, so much as is necessary for him to know that he may retain his position as a mounted officer; the rights and privileges and the relation that should exist between the medical officer and the commanding officer; the details of securing their uniforms and equipments, and how they should be worn; their duties as medical officers and in examining recruits, at camp, in policing; in superintending the preparation of foods; the morning sick call; sick reports; reports to the commanding officer and to the superior officers in the medical department; instruction in ambulance corps drill; instruction in company bearer drill; instruction in the ventilation of barracks and of modern war ships; instruction in the selection of camping places; instruction in camp hygiene; instruction in keeping the records in the army and navy; instruction in the heating of barracks, tents and modern war ships; instruction in the clothing for troops and their personal hygiene at various seasons.

These are a few of the subjects that might be taken up by a board of medical men for the instruction of medical officers on entering the service.

At present we are going over, in Massachusetts, the foregoing subjects in the schools and instructing ourselves. At the sessions that have thus far been held we have been fortunate in having present many of the gentlemen connected with the Army

and Navy Corps, who have given us the result of their experience, which we have highly valued.

One of the broadest influences which can be used to interest men in their work is, if the opportunity can be accorded them, to allow them to discuss what their work shall be. It is a safety valve, which allows men of extreme ideas to present their plans, and to have the wheat winnowed from the chaff.

Looking into the future, schools for officers in the medical department may be of great value, not alone to the military service of the nation and to the National Guard, but to the medical profession, as well.

When in Massachusetts we feel that we have conquered the A B C of military medical duty, it will be the effort of the Surgeon General to get the officers to take up lines of practical and scientific work, which may be of the broadest value to the Army and Navy and to the National Guard. There can be no doubt but that, while our ideas, as guardsmen, may at times be crude when compared with the officers of the regular service, yet the militia medical officer turns to his military work as a hobby. He rides it, and rides it hard. It is a break in his ordinary work; and we know that some of the most important improvements have originated with men who ride a hobby.

THE RECORD BOOKS AND BLANKS USED BY THE MEDICAL DEPARTMENT OF MASSACHUSETTS VOLUNTEER MILITIA.

BY LIEUT. COLONEL EDWARD J. FORSTER,

Medical Director 1st Brigade, Massachusetts Volunteer Militia.

When I was honored by your Committee with a request that I present a paper at this meeting, I was forced to decline, owing to the lateness of the hour, not wishing to make my first appearance without having made such a careful preparation as the character of this body demands.

In lieu of a set paper, I suggested that it might be of interest to show the manner in which the clerical work of the surgeon is attempted in Massachusetts.

I therefore have the honor to exhibit to you the books and blanks now in use. I think they may be of interest to very many of the surgeons present, from the fact that I find, upon inquiry, there are very few States where the use of books and blanks has been systematized. Many of the books and blanks shown today have been in use for years, while others have been only recently adopted. Colonel Alden has kindly furnished a set of books and blanks, such as are used by the Army; from them you will see where we have taken our models. We, however, have modified ours to meet the requirements of militia service. It would be better if every State had a Staff Corps, and we could conform more strictly to the Army standard.

I show you first the Company Sick Book, which though not strictly belonging to the Medical Department, is one with which the surgeon has much to do.

The next is the Medical Record or Sick Report book. This is merely a collection of morning sick reports bound together. As we in Massachusetts use three copies of this report, the extra one has to be taken from the end of the book.

The next is the Register and prescription book. We have included in this a Medical Journal.

The next is an order book and letter book. In our State we use a Shipman adhesive file. This saves much trouble to the surgeon, as in this are placed his orders, retained copied letters, receipts, &c. It would be very difficult to find a militia surgeon who had the time or inclination to keep such a book as is furnished by the Army to its medical officers. This adhesive file is truthfully a time-saving institution.

Besides these books, which may properly be considered as the books of record of the surgeon's office, there are others with which he is supplied and for which he must receipt, namely: The Militia Law; Regulations M. V. M. (a new edition of these is soon to appear); Manual for Medical Officers (this is obsolete so far as the tactics are

concerned); Tactics of the arm of the service to which he is attached.

We have in use 20 forms:

- Form 1. Requisition for medical and hospital supplies.
- “ 2. Invoice of medical and hospital supplies.
- “ 3. Receipt for medical and hospital supplies.
- “ 4. Invoice of medical and hospital property transferred.
- “ 5. Receipt for medical and hospital property transferred.
- “ 6. Hospital invoice, so called, used at annual encampments.
- “ 7. Hospital receipts, so called.
- “ 8. Return of medical and hospital property.
- “ 9. Inventory of military or medical property taken up.
- “ 10. Certificate of loss or expenditure of medical or hospital property.
- “ 11. Certificate of disability for absence.
- “ 12. Certificate of disability for discharge.
- “ 13. Certificate of temporary disability.
- “ 14. Naval sick report.
- “ 15. Binnacle list.
- “ 16. Emergency report of accident or injury.
- “ 17. Request for transfer to brigade hospital, etc.
- “ 18. Account for medicines, etc., purchased.
- “ 19. Invoice of medicines, etc., purchased.
- “ 20. Meteorological report.

I will casually refer to each of these blanks in numerical order, only calling your attention in a cursory manner to those which I think are peculiar to our service.

Nos. 1, 2, and 3 go together, and are simply those used by any medical department that has any blanks in use.

Forms 4 and 5 are of similar character and used when the articles are received by transfer from one officer to another.

Nos. 6 and 7 are used only at our annual encampments.

Form 8 is one around which all the other blanks seem to cluster, for most of those used are recorded eventually in form 8.

No. 9 is the report used by medical officers when articles are “taken up.”

No. 10 is an important one, as by its use the surgeon can

relieve himself of financial responsibility in case of loss or expenditure.

Nos. 11, 12, and 13 are somewhat similar in character to each other, being certificates of disability.

No. 13 is of value to the State financially, as by its use the State does not pay for men coming to camp who are not physically able to perform the duties required.

Nos. 14 and 15 are used only by the Naval brigade.

No 16 is a very important blank and required in every case of accident or serious illness occurring during a tour of duty. Many claims are brought every year against our State on account of accident alleged to have been received in the line of duty.

Form 17 is simply a form of request from surgeons asking the medical director of the brigade to furnish the ambulance for some specific purpose.

Nos. 18 and 19 are rarely used; as, the supply of medicine, &c., furnished by the State is sufficient for all ordinary purposes, these are used only in case of emergency, when a purchase is absolutely necessary.

No. 20 is simply a blank for a meteorological report of a week's tour of duty. This is only used by those who request the privilege of taking observations during an annual encampment.

[*Remarks on Col. Forster's Paper.*]

General Burrell:—Mr. President, these blanks are useful for our purposes. I believe that the United States Army blanks should form the foundation of our State blanks. I think the closer we adhere to them the better.

FIELD WORK OF THE HOSPITAL CORPS AS AFFECTED BY MODERN PROJECTILES.

BY MAJOR HENRY S. TURRILL.

Surgeon U. S. Army.

The battlefield experiences of the late war are no doubt ever present in the minds of those of you who experienced them, and field work under artillery fire probably holds precedence. You can with-

out doubt recall the fiendish shriek of the shell, the tearing, rending, deafening sound of the bursting, and the rushing scream of the flying fragments; the earth torn up and the dust and smoke making deathly seem very near. These were sights and sounds to shake the strongest nerves and make the chills run up the stoutest back, and make one wish that a rapid retreat could be affected with honor. But when grown older in these experiences, and finding that, although these same shells made a great deal of noise, their destructive effects to life and limb were not in proportion to the fears at first excited by them; we have learned to work on with a great degree of equanimity under their noisy demonstrations, and from continued experience come to look on this kind of battlefield danger almost with contempt, and to regard with much more anxiety the vicious hiss of the rifle-ball as it passes on its more deadly errand.

With the experiences of our late war, and that of the recent wars in Europe, the Ordnance Departments of all civilized nations have made marked progress in their implements of warfare; particularly in that of field artillery, and the present field gun is as great an advance as was the three-inch rifle over the smooth-bore Napoleon guns. The weapon now in use by field artillery, which will modify the principles of field work by the Hospital Corps, as founded on experiences of the late war, is the three and two-tenth inch breech-loading rifle. Some knowledge of its powers, of the projectiles used, of their destructive force, and something of the amount and character of the work that their use will throw upon the Hospital Corps in its field work, is the subject of this paper.

The principal points of interest to us in the gun are its range, rapidity of fire and its accuracy. In all these points, experiments with these guns give a great advance over any of the older patterns with which we have a battlefield experience. The extreme range is great, its projectiles having much more than a death velocity at 4000 yards, and a disabling velocity at 7000 yards, about 4 miles. With the ordinary well-trained gunners, these guns can be fired at unknown distances, where care in elevating the pieces is required, at the rate of three shots a minute; with the distance known, six shots a minute can easily be fired. The accuracy of such fire will be shown

in the accounts of the practice of the light batteries later in this paper. At a known distance a field battery of six guns can discharge thirty-six projectiles in a minute of time; these projectiles having a muzzle velocity of 1100 feet per second, and, at the distance of 4000 yards retaining much more than a death velocity, it being 763 feet per second at that distance.

Of equal or greater importance to us, in our field work, are the shells—of which the Hotchkiss percussion shell is a fair type—and projectiles used in these guns—these are solid-shot percussion, a recently invented shrapnel, the Frankfort Arsenal shrapnel. Recent target practice has shown that these modern rifles have but little more destructive effects with the first two, over the older pattern of guns, than greater range and more rapid fire, but the Frankfort Arsenal shrapnel has given such surprising results in the last year's target practice as to call for much consideration as to amount and character of wounds to be expected from its use. A short description of this projectile may be of interest: It consists of three parts, viz., a head, body and base. The head is of cast-iron, conical in form, with a screw-thread cut around its base, fitting into the forward part of the body; its point is bored and threaded to receive the Frankfort Arsenal combination fuse. The head contains a powder chamber of the capacity of two and three-quarter ounces of black powder. The interior of the powder chamber is lacquered to prevent premature ignition of the powder from friction. The body is made of lap-welded wrought iron or steel tubing, and is threaded in front and rear to receive the head and base. It contains a charge of 162 lead and antimony balls, 41 to the pound, one-half inch in diameter. These balls are held in circular layers by cast iron separators which hold the balls symmetrically, and prevent dislodgment of the balls under shock of discharge; the separators are grooved, as is the body of the shrapnel, so as to be broken into many fragments by the bursting charge in the head. The base is of cast iron, threaded to screw in the body, and is thick enough to support the shrapnel under the shock of the discharge. The fuse, which is either a time fuse or percussion, is so arranged that it can be exploded at any point in the flight of the projectile, or by percussion on striking. The in-

tervals of time for bursting are one-sixth of a second, which would allow the shrapnel to be exploded at any interval of 60 yards in its flight. The bursting charge being in the head, separates the fragments, but has little effect to retard their forward movement, and their forward velocity is about that of the projectile at the instant of fracture. The shrapnel as thus made up, consists of 202 pieces, which number is greatly increased by the fracture of the different parts of the shrapnel under the force of the explosion of the head; and 332 hits are reported from one shrapnel. The flight of the fragments is an extending cone, from point of explosion, for about four or five hundred yards, where most of the fragments lose their force and reach the ground. At the distance of twenty-five yards from the point of explosion, the cone of fragments has a base of about thirty feet. The Frankfort Arsenal shrapnel was first placed in use with the light batteries of the army during the target season of last year, 1893. A short consideration of some of the results of that practice will be of great interest to us in determining the amount and character of "first aid" work to be expected from its use in actual combat. To illustrate the danger space of the bursting shrapnel, a gun charged with shrapnel, the time fuse punched to explode at the muzzle of the piece, was planted on the bank of the Kansas River; the gun sighted to strike the water about 200 yards from the firing point. The Kansas at the point selected is about thirty yards wide, with a straight, smooth sheet of water for about 350 yards. On the discharge of the piece, the fragments of the shrapnel commenced to strike the water about thirty yards from the muzzle of the gun, and for the whole distance of smooth water, a space of thirty or forty yards wide, and three hundred and fifty yards long, the surface of the water was lashed into foam by the striking balls and the fragments of the shrapnel. These projectiles have been tested by the light artillery in all the situations in which artillery fire can be made effective, and some of the results of this practice will be instructive in making our calculations as to amount, and kind of "first aid" work, and also as to the time and manner of using the Hospital Corps on the battle-field. The following is an example of the results of the shrapnel fire, at known

distance: Target-silhouettes, to represent a platoon of light artillery (two guns), were placed to cover just the space, and in just the position that would have been occupied by guns, limbers, caissons, men and horses of a platoon in action. At these targets were discharged ten shrapnel, the distance being 2000 yards, and well known to the gunners. The result was that every gun, limber, caisson, horse and man in the platoon—except two men—were hit; one target of a man having eight holes through it. The two targets not hit were the chief of platoon and a chief of section. At the distance of two thousand yards the velocity of the fragments would be but little less than one thousand feet a second; with a six gun battery of three and two-tenth inch breech-loading guns, those shrapnel could be hurled on that platoon of artillery in twenty seconds. It is not hard to calculate the amount of destruction that would have been caused by that storm of lead and iron, sweeping through that platoon at the terrific rate of 1000 feet a second, and the awful wounds that would have been made by those jagged pieces of steel, driven by that tremendous force.

A second result of known distance-firing: Three targets ten feet high and 21 feet long, were placed in echelon at intervals of 15 yards, the first target 1940 yards from the guns, but completely concealed; the targets being about 15 yards below a hill; the only mark for the gunners being a flag on the crest of the hill, and 1874 yards from the guns, twelve shrapnel were discharged at these concealed targets with the following result: 1st shot, 332 hits; 2nd shot, 45 hits; 3d shot, 142 hits; 4th shot, 194 hits; 5th shot, 12 hits; 6th shot, 55 hits; 7th shot, 107 hits; 8th shot, 1 hit—the shrapnel went through the second target and exploded behind the last target; 9th shot, 205 hits; 10th shot, 45 hits; 11th shot, 33 hits; 12th shot, 18 hits. Total number of hits, 1189. These twelve shots could have been delivered by a six gun battery in twenty seconds, and considering the small part of that little valley covered by those three targets, which received that great number of hits, the amount of death and wounds can be easily imagined, had that little valley contained a squadron of cavalry or a regiment of infantry believing themselves under cover and waiting to move into action.

The above results were achieved where the distance was known, and no time was lost in ascertaining the distance, and the amount of elevation necessary to carry the shrapnel to the proper place for most effective bursting; but at unknown distances this shrapnel also proves very destructive. In the target practice of Light Battery "A," 2nd U. S. Artillery, a target 10 feet high and 60 feet long was planted. The battery went into action at an estimated distance of 1435 yards, and discharged 12 shrapnel; the result was 344 hits in the target. The distance measured after the firing proved to be 1334 yards. At a second trial at the same size target, 12 shots, distance estimated to be 2225 yards, the result was 667 hits in the target. A third trial—target same size—twelve shots, estimated distance 2750 yards, gave 598 hits in the target. The total number of hits for the 36 shrapnel was 1619. Had that battery been firing on advancing columns of infantry or cavalry, at the different distances, they could have delivered their fire at the first or nearest range, then at the second, and finally at the longest range, and have fired all of those 36 shots in the short space of two minutes, and those forces, if armed with the Springfield rifle, would have been practically helpless, and unable to do any damage to the battery. Even if armed with the new Krag-Jorgensen magazine gun, which, at the shorter range, might have produced effect, at the two longer ranges would have been nearly as helpless as with the old pattern rifle.

For comparison, and to show that the great percentage of hits is due to the projectile rather than to the superior power of the gun, or the skill and accuracy of the gunners: The result of ten Hotchkiss percussion shells fired by the same battery (Light Battery "A," 2nd U. S. Artillery) at the same target—i. e., 10 by 60 feet—at an estimated distance of 2150 yards, found on measurement to be 2035 yards, showed but 4 hits; a further trial at 3265 yards gave but one hit in the target—about the results to be expected from the same class of projectiles in the old three-inch rifle. These results are drawn from the target records of five different light batteries of three regiments of the U. S. Artillery, and are about the average effectiveness of the last autumn's target practice with the Frankfort Arsenal

shrapnel. What are the deductions to be drawn from these experiments with this projectile?

It would seem from its apparent effectiveness, that it, or one of similar construction (the English, French and German artillery each have a shrapnel very similar and of about the same destructive force), will be the projectile used in all hostile encounters, and that field artillery will have a much greater value in the effective force of an army than that now given it. If these experiments with the Frankfort Arsenal shrapnel are correct, they show that from their use in actual combat we must expect a much larger number of wounds, and those of a very grave character; and that, while from the Krag-Jorgensengun we are able to expect less laceration in the wounds produced, in the Frankfort Arsenal shrapnel we must expect the greatest destruction of tissue, and wounds that will require very much greater care in the treatment on the battle-field.

It is hardly necessary to call to your minds what must have been the destruction to any body of troops concealed in that little valley mentioned before, and so distant from the attacking battery, that even the long-range Krag-Jorgensen rifle would have had but little disabling effect, when in those few seconds of time that storm of lead and iron swept through it. Of the space in the valley exposed to the fire of that battery, only the small part of 10 by 20 feet was covered by the targets, yet those targets received 1889 hits. It is safe to estimate that each shrapnel will fracture into at least 250 pieces, including the 160 balls, so that for those 12 shrapnel expended on that valley, we have at least 3000 fragments, driven at the more than death velocity of 1000 feet a second, and all the storm of lead and iron almost completely under the control of the gunners as to the point where it shall expend its deadly force. The varying sizes of fragments, from the solid unbroken base of the shrapnel, of two or three pounds in weight, to the small irregular bits of the brass fuse, all will unite in producing wounds of varying gravity, so that we must expect, when called to render first aid assistance to a body of troops, that have faced the destruction wrought by these modern breech-loading field guns, charged with the modern shrapnel, to find an unprecedented number of wounds of the gravest character.

At the closing exercises of the school of application of the cavalry and light artillery, the command, consisting of eight troops of cavalry and three light batteries, was divided into two opposing forces, and for six weeks almost daily movements of attack and defense, in all the movements of opposing brigades, were practiced. The Company of Instruction, Hospital Corps, participated in their proper place in all these movements. The reservation at this post is large—about 26,000 acres. It is very diversified, with three rivers running through it, the Republican, the Smokey Hill and the Kansas rivers. Included in the Reservation are large plains, rolling country, and rough hilly country cut with deep ravines, all making a country over which all the movements of attack and defense can be executed with the best effects, and giving an opportunity for points of strategy in the commands of the opposing brigades, that is probably not equaled on any other reservation in the country. These encounters were made realistic in everything, except the actual use of offensive and defensive missiles, used in actual conditions of warfare. Umpires were on the field to decide the different points of the combat, and the amount of loss to each party, based upon the results of the target practice of the cavalry and artillery. The Hospital Corps company was used on the lines of a brigade, as laid down in the "Field Sanitary Service" of Major V. Havard, Surgeon U. S. Army; working from the "first aid" field work back to the dressing stations, and by ambulance to a station of a field hospital. Of these movements there were thirteen engagements that simulated the attack and defense of brigades in their various movements of advance guard in open country; advance guard in close country; rear guard against advance guard; reconnaissance in force with cavalry combat; passage of defile; escort and defense of convoy; passage of streams with defense of fords; attack and forcing passage of stream; with various other manoeuvres of a mounted brigade of cavalry and light artillery. A careful observation of all these movements, and consideration of the amount of damage that must have occurred to the contending forces, as drawn from the known effectiveness of these troops in their target practice, brought very forcibly to my attention two ideas which I believe will be found cor-

rect in actual combat, namely: That the losses to the combatants under fire of light artillery will greatly exceed any present calculation, and that the 15 per cent. of disabled, of Major Havard's estimate, will be very greatly exceeded, and that in the sanitary field service we must be prepared both with men and material, for the care and treatment of a very much larger percentage of disabled men; that the wounds will be of a very grave nature, the laceration and destruction of tissue in each case as great as was found resulting from wounds inflicted by the old Hotchkiss percussion shell, and from the much greater number, a much greater tax on our resources. During most of these exercises I assigned to my junior officers the duty of conducting the movement of first aid on the field, and removal to dressing station, and to ambulance station and to field hospital, reserving to myself a general oversight of the whole work and placing myself in such situations, that I could overlook the whole of the hospital corps' work, as well as the position of the defense and that of the enemy. My object was to observe what would be the probable effect of the fire of the different arms, on the space over which the Hospital Corps must pass from their work on the line of battle back to the dressing station, and to the ambulance and transportation to the field hospital. Applying to these actions all the information gathered from the target practice, I found that where small arms were being used, first aid work could be carried on during an action with the usual degree of danger to first aid parties, that is, and always has been, expected in such service; but when under fire of shrapnel, if in actual combat, the same conditions of accuracy and rapidity of fire should obtain as was shown in target practice, no force of sanitary soldiers could pass that region of death of three hundred yards in rear of the battle line, and that all work over this danger space would have to be suspended until the firing by the artillery had ceased, and all work of care of the wounded would have to await the result of the engagement and the cessation of the shrapnel fire.

FIRST AID ON THE BATTLEFIELD.

BY HENRY G. BEYER, M. D., PH. D. (J.H.U.),

Surgeon U. S. Navy.

In view of the title of my paper, I have felt it incumbent on me to make a few remarks of explanation, for, it might be asked, with not unseemingly propriety: What has the naval surgeon to do with the battlefield? I have, indeed, frequently received the impression from conversation with army surgeons, as if they held the idea that the litter, the ambulance, the field tent and hospital are things with which naval surgeons have little or nothing to do. This is a mistake. During the eighteen years of my connection with the naval service, the operations of the navy in which my services in foreign ports might have come into requisition in an action, have been shore operations. It is, therefore, evident that during such operations our duties are identical with those of army surgeons. In our hospitals on shore, and in the process of transporting patients from ships or other shore stations to these, the litter and ambulance are in constant use, and so far, certainly, whatever means of transport are considered necessary for the army are likewise indispensable for the navy and any improvement in the one might readily be conferred to the other.

On the other hand, while we have the additional duty to perform, to move our patients in boats, perhaps apply first aid in them, this may likewise become the duty of the army surgeon when it becomes necessary for his regiment to cross a river or, whenever his patients will have to be transported in ships or boats. Thus, it will be seen that our duties in many ways are identical in kind at any rate, and that, at times, the army litter and ambulances must be called into requisition in naval operations, just as it may happen to the army surgeon that he may be placed into a position when nothing will serve his purpose so well as Gihon's ambulance cot. First Aid, of course, remains absolutely the same in the Navy that it is in the Army.

The adoption and general introduction of the modern small arm of reduced caliber for infantry, and a thorough experimental study of the effects of the new bullet on the human body, have made a revision of our methods of administering First Aid to the wounded on the battlefield and transporting them to a place of safety, a necessity. One of the first conclusions which the experimenters in this line of research were able to draw from their investigations was, that the total number of wounded would be largely increased on account of the deadly range of the new small arm having been greatly extended. The deadly zone of the new rifle, whether Maurer, Maennlicher, Lebel or Krag-Jorgensen, reaches 500 meters from the muzzle of the gun according to the calculations of Habart.

In accordance with this result before them, based, as it is, upon a large number of experiments upon human cadavers as well as living animals, the Germans have deemed it necessary to increase their sanitary corps which, at the present time and, without counting the reserves, will number 45,000 men when all the twenty army corps are in the field.

Every company has now four bearers and every battery two. Including musicians, who have lately also received training as bearers, every single army corps has now 1168 litter bearers. In Russia, the number of litter bearers has even been increased to six per company or two more than in Germany. Austria provides the same number as Germany, namely, four to the company.

As regards the personal wound package, introduced by von Esmarch, and which is worn by every soldier, no change has to my knowledge been made. Delorme, one of the foremost French experimenters with the new rifle, states that the personal wound package, if necessary before, has become still more unavoidable to-day.

So far, then, it is plainly to be seen that an increase in the number of men constituting the sanitary corps was one of the direct results of the introduction of the new rifle. Let us now see what some of our best and most experienced military surgeons have to say on the subject of First Aid, and how it has been influenced by this change of arms.

First Aid has derived its name from being first in time; in our

opinion it should also be looked upon as first in importance, for, in the majority of cases, the first help decides the fate of the injured person; accordingly, the foremost military surgeons of to-day have given it their earnest and undivided attention.

According to a standing order in the German army, the place where the first dressing and bandage may be applied must be about 4000 meters behind the line of fire.

Habart, the eminent Austrian experimenter, thinks that nothing much can be done directly in the rear of the line of battle, and that the chief attention must be paid to a safe and easy transport of the injured; that, in other words, it is not the first bandage upon which so much depends as the first transport. It has even been thought that it will be impossible to move the wounded during the progress of a battle. Haase, on the other hand, thinks that the transport is possible even during the progress of a battle; he, moreover, considers that 2400 meters behind the line of fire is a safe distance for the first dressing station, and his extensive experience in the war of 1870-71 would certainly entitle him to speak with authority on the subject. When we recollect that at the battle of Gravelotte 19,863 were wounded owing to the superiority of the Chassepot and its murderous effect, and that all were under shelter within 24 hours, besides a good many French soldiers who had been left uncared for, we must be convinced of the great benefits coming from proper, well-conducted sanitary organization.

But, whether 4000 or 2400 meters, the most important question in either case would be as to what constitutes a safe and easy transport for either distance. Transport that would be injurious or fatal to the injured person had better not be undertaken. Certain cases of injury to be safely transported, may need the application of splints and bandages, no matter how short the distance may be. If, then, we believe with Haase, that it is at all possible to act during the progress of a battle, the application of temporary and improvised splints to broken bones and a circular Esmarch's bandage in cases of severe arterial hemorrhage, it seems must be applied on the field. The first aid man, therefore, is expected to be able to discriminate be-

tween cases that may be transported without splints and cases that need splints previous to being transported.

One of Habart's expectations, in which most of the experimenters concur with him, is, that there will be many more slightly wounded in the next war than severely wounded, and he also states it as one of the most important problems to be solved by the military surgeon in the field, to be able to distinguish quickly between slight and severe injuries, because of the treatment required for either case being essentially different.

During the war of 1861-65, a time when antiseptic surgery had scarcely been conceived, and during that of 1870-71, when it had not yet reached the age of practical application, its influence on wound-healing was, consequently, nil, and all gunshot wounds were attended by what we now know to have been wound infection, showing either merely local symptoms such as suppuration, or, being accompanied by the more general symptoms of septicaemic poisoning.

Is it therefore to be wondered at that the impression at that time prevailed that all gunshot wounds were primarily infected? Is it, moreover, not also rather to be expected that this impression should still be the prevailing one among those who have gone through the experience of those wars, and who have not only seen but treated thousands of such cases?

The same might be asked as to the open method of treating these injuries. The first serious steps toward a revolution of our ideas on this point, especially the open method of treating gunshot injuries, had been taken, no doubt, after von Bergmann published his experience in the Russo-Turkish war in 1877. The unexpected and splendid results obtained by him, especially in his gunshot injuries of the knee-joint, under partially antiseptic dressings, mark the turning point with regard to our views of the primary condition of gunshot wounds being always infected ones. The observations published since then by the most experienced surgeons, have furnished abundant and incontrovertible evidence of the fact that the great majority of gunshot wounds are indeed primarily simple uninfected wounds.

The recognition of this far-reaching and important fact was all that was necessary to bring about a most radical change in our methods of treating gunshot injuries. Instead of the primary debridement, a more expectant plan of treatment has been adopted; instead of the open method of treating these injuries, primary occlusion has in fact been recommended. This, certainly, is the tendency of the best authorities on treatment, so far as we have been able to gather from the literature of the subject, more, especially at the first dressing stations, conservative surgery has again come to the front.

Thus Langenbuch, having long been convinced from his experience in 1870-71 and from observations made since that time, that gunshot wounds are not primarily always septic in their nature and that, therefore, one of the prime objects being the prevention of secondary infection, proposed, in 1892, at the Congress of German Surgeons in Berlin, that the simpler gunshot wounds be hermetically sealed, temporarily at least, by means either of rubber plaster or, if needs be, by temporary sutures, this treatment to be applied by first aid men properly trained for this purpose.

It was hardly to be expected that so bold a proposition, so radical a departure from pre-existing methods should not have met with a certain amount of opposition, and even Langenbuch, himself, did probably not expect it then. I doubt, however, very much that the same proposition offered to-day with two years' more experience gained, would be seriously objected to.

But this tendency towards adopting the expectant plan of treatment is not altogether confined exclusively to the simpler non-complicated gunshot injuries, for even in cases of such injuries as are complicated by fractures, we have the authority of Wagner, who recommends the expectant plan of treatment rather than the employment of primary debridement. In cases of extensive splintering of bones, Wagner uses the irrigator for the removal of small fragments of bone and of marrow, pours a solution of 10 per cent of iodoform in glycerine into the seat of fracture through the wounds of exit and entrance, and awaits the results under a bandage. This method has been the one in use in the late Servio-Bulgarian war and the results were attended by one of the smallest death rates yet obtained, namely

1½ per cent. The death rate in the war of 1870-71 was, as you may remember, 12 per cent. Reyher, of St. Petersburg, at the International Medical Congress of London, also advanced the most noteworthy arguments against the unconditional primary debridement, the practicability of which is only admitted by him whenever large fragments of bone and other tissues, such as muscles and tendons, are found to be hanging out of the wound, with visible signs and gurgling noises indicative of the presence of air in the deeper parts of the injured limb, or when it is certain that the wound was rendered impure by cloth, straw and faeces having been accidentally introduced.

On the other hand, whenever the wounds are small and clean, when they show no destruction of the soft parts, no air in the interior, then Reyher recommends the encouragement of healing under a scab. He proves by figures that a greater number of deaths has occurred due to wound infection, where primary debridement was employed, than where healing under a scab was allowed to go on. The death rate of the former treatment was 23.6 per cent, and that of the latter only 15.7 per cent. Von Bergmann also is against the immediate debridement.

The experience of those best entitled to speak with authority on this subject would certainly clearly indicate to my mind two things, namely: (1) That gunshot wounds are only exceptionally primarily infected wounds; (2) That the danger from secondary infection is greater by far than that of primary infection; (3) That nature, in some way, can take care of a few germs that may have found their way into a wound either through the projectile or clothing, provided that these germs are not of the septic or pyogenic kind.

Does bacteriology furnish us with anything reliable that has a direct bearing upon this subject?

Not very long ago, Captain La Garde proved by experiment that it was indeed possible to carry pathogenic germs into an animal or into sterilized cotton or gelatine by means of an infected projectile, and that the act of firing alone by no means prevents this result nor causes the sterilization of the infected bullet.

Meissner, also, produced all kinds of infection through the

medium of an infected projectile fired from the new rifle. These experiments, undoubtedly would establish the fact that gunshot wounds can be infected by infected bullets, and that the heat produced by the combustion of the explosive substance or that produced by the friction caused by the bullet rushing through the atmosphere or even that produced by the collision of it with some resisting object, is not sufficiently great to bring about the sterilization of the projectile.

But La Garde has also shown by experiment that sterilized projectiles fired from sterile guns, produce no infection, and he has, furthermore, found that 53 per cent of all the projectiles are absolutely sterile in their original packages.

This important fact ought, most certainly, go far to explain the healing of simple gunshot wounds produced by the new projectile, which has been noticed and observed so frequently of late and in which no sort of inflammatory reaction of any kind has attended the healing process.

The notion has always prevailed among military surgeons that, whenever pieces of clothing are carried into and remain imbedded in a wound, infection has certainly been carried into that wound, and the open method of treating such wounds was adopted without further hesitation, notwithstanding the fact being perfectly well known that pieces of clothing could and did sometimes heal into a wound without causing any trouble for years.

Bearing upon the question of infection being carried into wounds through pieces of a soldier's uniform, Pfuhl, quite recently, and at the suggestion of Langenbuch, made a series of inoculative experiments, the results of which have shed considerable light on it.

Pfuhl took pieces of clothing, removed directly from the uniforms of soldiers, and buried them under the skin, in the muscular substance, in the pleural and peritoneal cavities of both mice and rabbits, both animals being highly susceptible and reacting like man on the introduction of septic and pyogenic micro-organisms. The pieces of clothing were taken from places that were especially exposed to the perspiration of the body and to the street-dust and which consequently, contained many bacteria.

Of the twenty-six mice that were inoculated in this manner not a single one showed the least sign of wound infection; but whenever a piece of cloth was infected with staphylo, aureus or with any of the streptococci, the usual results followed, namely: either local suppuration or septicaemic poisoning ending in death. Identical results followed the experiments made on rabbits. The pieces of cloth varied in size from a few threads to three centimeters square, and were taken from the underclothing as well as from the outside clothing of soldiers. The results of Pfuhl's experiments may therefore briefly be stated to be as follows: Of the forty-six small and five large pieces of clothing, taken directly from the body of soldiers and buried immediately into the tissues of highly susceptible animals, not a single one produced either simple or purulent inflammation, or gave rise to any constitutional symptoms of blood poisoning. None of the fifty-one pieces of clothing contained virulent micro-organisms, although many other bacteria. Such results are certainly most novel and surprising even at the present day.

According to Pfuhl staphylococci or streptococci could not thrive in human clothing and would, even if present at any time, soon die.

Similar experiments with identical results had already been made in 1888, by Fraenkel, of Vienna.

The danger of wound infection from gunshot wounds, it would seem, lies not so much in the projectile or in the clothing that is carried with it into the wound, but rather in the handling of it by the attendants, whose hands are infected with pathogenic germs, and this must be more frequently the case in hospitals than in the field.

This whole question, then, in relation to wound treatment in the field, more especially as influencing First Aid, may be summed up as follows:

1. It is generally admitted by the most experienced military surgeons of Europe that antisepsis is not practicable at the first dressing station nor in the field. This is quite readily understood when we try to realize what a gigantic operation the next great European war will be and how rapidly the wounded will accumulate during an action; but this is not necessarily true for smaller military expeditions.

2. Experience so far gained in the care of gunshot wounds caused by the new rifle and bullet either in the field or experimentally, shows that an uncommonly large number of the simple flesh wounds and even some complicated by broken bones have healed under the first dressing and without showing any signs of wound infection.

3. These observations, together with those made during previous wars, would seem to make it pretty certain that the almost general as well as universal wound infection prevailing in all gunshot wounds in former wars was more often due to the introduction of germs by human hands and instruments than to bullets.

4. The small caliber of the new projectile, combined with its increased power of penetration, produces a much smaller opening than would be necessary to admit the finger for purposes of exploration; the bullet almost never remains imbedded in bone; hence digital explorations and instrumental bullet extraction having become, to say the least, unnecessary, the indications for the first treatment of gunshot wounds would most decidedly point toward a rapid hermetic sealing of such wounds, providing a method can be devised that will secure this result with absolute certainty and which will not add insult to injury.

5. Esmarch's bandage and wound package, as has been admitted by von Esmarch himself, not being absolutely reliable in producing such results on account of the bandage being too liable to slip during transport and incapable of such firm application so as to prevent its slipping under all circumstances, the method proposed by Langenbuch deserves our most careful attention and examination. Langenbuch has recommended the hermetic sealing of those of the gunshot wounds that have been included under the collective term of "slight" (*Leichtverwundete*) by means of properly prepared adhesive plaster or by temporary sutures by first aid men trained for this purpose.

Langenbuch has only lately published the histories of eleven cases of gunshot wounds, in four of which the thorax had been perforated and in all of which his method of treatment had been employed without giving a single bad result. In a foot-note to his article (*D. Med. Wochenschr.*, 1894, No. 12) he states that the num-

ber of cases thus treated with identical results has doubled since his manuscript was sent to the printer. In order to imitate as nearly as possible the conditions obtaining in the field, Langenbuch purposely omitted the disinfection of the skin as well as of the wound itself, believing, as he does, that the disinfection of the wound is useless and that of the surrounding skin not altogether free from danger. He admits, however, that the needles and catgut ligatures as well as the operators' hands were aseptic but that neither fingers nor needleholders were brought in direct contact with the wounds.

In further proof of the correctness of his views, Langenbuch cites the published observations of Simon and Socin made some years ago in regard to gunshot injuries of the knee-joint. In such of the injuries, namely, that occurred at that joint when the limb was in semiflexion, the skin wound would slide away from that of the deeper parts whenever the leg was brought into its normal position. No direct communication between the wound of the deeper parts of the joint and that of the superficial skin existed, the healthy skin having closed it after the manner of a valve. In all such cases the deeper parts healed without a bad symptom while the superficial skin wounds showed suppuration, apparently demonstrating to a nicety the beneficial effects of immediate hermetic sealing of such wounds. The success obtained by von Bergmann in his gunshot injuries may not improperly be explained on the same lines.

There will, no doubt, always be a certain amount of blood and serum present in injuries of the deeper parts, but these effusions, providing the air is kept away from them, may safely be left to absorption; besides, blood serum has antiseptic properties sufficient to take care of a few non-pathogenic bacteria as is well known, and as Pfuhl's experiments have still further illustrated.

Gentlemen, these great lessons in military surgery and antisepsis, the results of hard-earned experience as well as of the highest qualities of judgment and accuracy of observation, can certainly not be without influence on the principles and methods of administering First Aid.

Every experienced military surgeon must agree with von Bergmann when he says: The first dressing decides the fate of the

wounded, and as long as fifteen years ago he stated it as the result of his experience, which we all know was uncommonly great even then, that the most important requirement of first aid was the rapid preparation of the wounded for safe transportation. According to von Bergmann, the dressing intended to immobilize fractures must be such as can remain for some time untouched, and Langenbuch adds in regard to light wounds, that their first dressing ought to be such that it might remain until healing takes place, providing the signs of infection remain absent.

If, according to the late Billroth, we may expect that the youngest military surgeon of to-day will, with a clean hand and conscience, accomplish more than did in former times the most learned professor, permit me in addition to express my hope, if not conviction, that the first-aid man of the future, properly trained as I have seen it done by the medical officers in our own small army, will be able to save more lives than did the most careful and conscientious military surgeon in the past.

EQUIPMENT AND INSTRUCTION OF SANITARY SOLDIERS OF THE U. S. ARMY AND NATIONAL GUARD.

BY CAPTAIN CHARLES F. MASON,

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War has for its object the crippling, and finally the overpowering of the enemy in the shortest possible time. To this end every part of the military organization must contribute its quota, and not least important of these parts is the Medical Department.

The necessity for the prevalence among the troops on the fighting line of the confidence born of the assurance that if hurt they will be well cared for, and the absolute need of relieving an active army as quickly as possible after a combat of the encumbrance of a host of wounded and disabled soldiers, are the strong military reasons for the existence of the Sanitary system. To accomplish this object, to assure the most skilled and scientific treatment from the standpoint of the modern surgeon, and in addition to restore such as are

lightly wounded to the ranks of the effectives as early as possible, should be the main aim kept constantly in view in the equipment and instruction of the sanitary soldier.

Under the designation sanitary soldier, as I use it, I intend to include the company bearers, the hospital corps of the U. S. Army, and the corresponding personnel of the National Guard. It is beyond the scope of my present paper to consider the existing organization of our hospital corps, but it seems likely that the use of the new small caliber rifle with smokeless powder, and the consequent changes in tactics, will cause an increased number of wounded in a given time, and that these will be scattered over a wider area, necessitating an increase in the proportion of the hospital corps to the combatant forces; this will mean more litters, and more litter bearers, and to increase the former without too great an increase in the number of the latter, it has been suggested to reduce the litter squad from four to three men, a change which seems to me desirable and indeed inevitable.

The equipment of the sanitary soldier, to which I shall first refer, should be uniform for the U. S. Army and National Guard, and clearly described in regulations, thereby facilitating purchase and supply in time of war. Every soldier in the field should carry on his person a package of dressings; for this purpose the dressing packet as now provided answers admirably; I would suggest to prefix to the printed directions the words "Stop hemorrhage, and if there be time, scrub the skin thoroughly about the wound," and add "Don't finger the wound." The company bearer, being merely a temporary emergency man, needs no special equipment, as such. I believe the field tourniquet in his hands is more apt to do harm than good; he can prepare a tourniquet extemporaneously, the action of which he understands and which is more easily applied.

The new field equipment for the U. S. Army recently supplied is an advance over that which it has replaced. At present it consists of: No. 1, medical chest, weight 86 pounds; No. 2, surgical chest, weight 90 pounds; No. 3, commode chest, weight 36 pounds; No. 4, field desk, weight 91 pounds; No. 5 mess chest, weight 140 pounds; No. 6, food chest, weight 80 pounds; No. 7, reserve chest (contents

unknown, not yet provided), of folding field furniture, packsaddles to carry the medical and surgical chests, when it is necessary to use pack animals for this purpose, and lastly the personal equipment of the medical officers and hospital corps. I shall consider only the appliances for medical and surgical treatment proper, excluding field furniture, mess outfit, etc. The first thing one notices in a general survey of this equipment is the absence of any trays or basins, and in practice this deficiency makes itself felt at once. An equipment intended to be complete should not lack those indispensable articles; on more than one occasion I have observed much rushing around camp to obtain them from all sorts of sources, whereby valuable time was lost at the very beginning of an operation through dependence on outside aid. These basins are needed for the washing of wounds, the boiling of instruments, the reception of aseptic and antiseptic fluids; there must be plenty of them, and they should be always available.

The next point is the insufficiency of materials for fixed and movable splints; fractures will be frequent and gypsum bandages are indispensable for many purposes, especially in the preparation of fractures for long journeys; let us have, as soon as possible, a special chest containing everything necessary for fractures and nothing else—a fracture chest; and in the meantime let us replace the flaxseed meal and the candles of drawer No. 6, medical chest, with an air-tight tin box containing gypsum bandages.

Now to consider the articles of equipment in detail:

The medical officer carries on his person the "Surgeons' Field Case," a very useful and compact arrangement containing a few of the most necessary instruments in a wooden case, with leather pouch and sling strap; only let us have a strong needle holder and a good artery forceps in place of the combined instrument, and substitute for the wooden case one entirely of metal, with a close-fitting cover and removable racks, so that the instruments can be sterilized by boiling in their own case, and after use the water can be poured off and the instruments and case dried for transportation. No provision has been made in this case for a hypodermic syringe, but of course the surgeon should never be without one on his person.

The special equipment of the privates of the Hospital Corps consists of a knife and pouch. The purpose of the knife has never been officially stated, but I assume it is intended chiefly for cutting and preparing small poles in the preparation of extemporaneous litters, travois, etc., and in the manufacture of splints.

For this purpose its utility would be increased by the addition of saw teeth to the back of the blade; the edge of the present knife also needs hardening as I have found it to turn easily when used on hard wood. The pouches are of two kinds, hospital corps pouch and orderly pouch, each weighing with contents about four pounds. Both contain a small quantity of dressing material, scissors, dressing forceps, sponges, pins, vaseline and tourniquets; the rest of the contents differ in the two pouches, the one containing in addition to the above-named articles, a candle, iodoform, jackknife, needles and thread, adhesive plaster and a pair of small wire splints; the other a small case of tablets, medicine glass, pus basin, catheter, chloroform, hypodermic syringe and a book of diagnosis tags. To each should be added a nail brush, a piece of soap and an aluminum tray filling the front of the pouch and containing in its concavity the articles belonging there. A defect in the present pouch is apparent in the shortness of the slings which cannot be made sufficiently long for a tall man.

Coming now to the medical and surgical chests, experience has shown that they are not strong enough; the locks and catches are all too light, as is also the woodwork; under not very rough handling the former have bent and the latter has split. The contents of the chests are generally well chosen and arranged as far as they go, but to make them complete in themselves, a place must be found for a set of trays, some of plain metal for boiling instruments, and others glazed for antiseptic solutions, etc. They could be so arranged, too, that the edge of one would fit into a flange and groove of another, with catches, so that the boiling point might be raised under pressure, thus insuring sterilization in a shorter time. I would suggest having drawers Nos. 2, 3, 4, 5 & 7, of the medical chest, and all but No 1, of the surgical chest, double, the inner drawer being of metal; when this is needed as a tray or basin, its contents are placed in the proper

wooden receptacles; not much space would be thus lost, and the surgical advantages would be great. Or else let us devote one drawer of each chest to a nest of trays (metallic), packing the contents elsewhere, or dispensing with those we can spare best. We now have a nail brush in the surgical chest, let us have another in the medical chest. Fill the two empty four-ounce bottles of the medical chest, the one with soft soap, the other with carbonate of soda, and our surgical outfit is complete and up to date. I have already suggested the replacement of part of the candles and of the flaxseed meal by fixed bandages. Instead of the catgut, as at present supplied in carbolized oil, substitute coils of dry gut in small double envelopes, sterilization having been previously effected by dry heat as suggested by Dr. Boeckman, of Saint Paul.

INSTRUCTION.

In devising and carrying out a system of instruction for the Hospital Corps, it should be kept constantly in mind that we are preparing for a state of war and war under modern conditions; the duties of these men in time of peace are multifarious and important, but after all war gives them the very reason for their existence, and will test their previous training to the utmost. In the first place, the private of the Hospital Corps must be a man of intelligence, able to read, write fairly accurately from dictation, and understand the simpler operations of arithmetic; he should preferably be one who assumes the special duties from choice, and a year's previous military training in the line is most desirable; discipline is essential; nowhere is willing, cheerful and intelligent devotion to duty and implicit obedience to orders more necessary than in the sanitary service, and it cannot be too thoroughly taught in an organization where every man must be a good sanitary *soldier*. I always endeavor to have the men of my detachment take pride in their soldierly appearance.

The scheme of instruction which I will here outline can, of course, be carried out fully at all times in the case of the sanitary soldiers of the U. S. Army, only; when, however, those of the National Guard are camped with the former, the instruction in field exercises can be carried on together with great advantage to both, the larger

number of men becoming thus available, enabling the scope of exercises to be extended and the points better illustrated. The handling and management thus of a larger force, such as he would be likely to command in war, would give to the instructing medical officer valuable experience, so hard to gather in our small peace establishment.

In garrison the official regulations as to calls, inspections, etc., should be strictly carried out as with companies, and cleanliness of person, clothing, and the hospital and its contents be rigidly insisted upon.

On rising, the detachment under command of a non-commissioned officer is put through the setting-up exercises, for fifteen minutes, immediately after reveille daily, except Saturdays and Sundays. Not less than one hour each day (Saturdays and Sundays excepted) should be devoted to the instruction of the corps by a medical officer, and besides no opportunity should be lost to show the men the practical application of what they have been taught. Every private should be able on occasion to take the place of the Acting Hospital Steward, and every Acting Steward that of the Steward. Every man should be taught cooking, driving, riding (when practicable), at least the elements of pharmacy, including a familiarity with drugs, their appearance, dosage and poisonous effects; and each one should know the symptoms and danger from poisoning from carbolic acid, iodoform and corrosive sublimate when locally applied; also the symptoms produced by an overdose of opium. During the winter special attention should be given to theoretical instruction, embracing as much of anatomy and physiology as is given in Smart's Manual, materia medica and pharmacy, so far as indicated above, hygiene, minor surgery and bandaging. The principles and practice of aseptic and antiseptic surgery, the "modus operandi" of infection and disinfection, and the practice of ventilation should be indelibly and clearly fixed upon the minds of the men. Candidates for promotion to the grade of acting Hospital Steward, should be required to become proficient in the preparations of the various reports and returns of the Medical Department, and more advanced instruction in all the branches taught given them. Recitations should be held at least

twice a week, all men reciting to medical officers except upon the subject of Tactics, when the non-commissioned officers will recite to the medical officer, and the privates to the non-commissioned officer. Reviews should be frequent and thorough and those who purposely fall behind should be brought up to the mark by deprivation of privileges or other means of discipline. Instruction in nursing should be largely practical and take place in the wards; to illustrate the removal of clothing, change of bedding, use of bedpan, disinfection of excreta, feeding by the rectum, recording pulse, temperature and respiration, baths and many other points. Now, too, the men should be made familiar with the name, purpose and care of every appliance furnished for the hospital; when the emergency arises it is too late for this; they must know the name of the various instruments, and be able to produce them promptly when called for by name; how to sharpen instruments, the preparation for operation, and the cleaning and care of the instruments after operation; how to keep a hypodermic syringe ready for use, how to sterilize, and keep in order hard and soft rubber goods; the use of the special splints, fracture box, etc. (and while upon this subject, would it not be a good plan to give Hospital Stewards stationed in or near large cities an opportunity to learn from instrument makers how to sharpen instruments properly?); each man must be rotated in office until he has remained in the various positions of wardmaster, nurse, cook, etc., at least two months; and after that they can be assigned according to circumstances and the peculiar aptitude of each. A man under instruction in the kitchen commences at the bottom and goes to the top, ending by having entire charge of the kitchen for thirty days if practicable. When the course of instruction already mapped out has been completed, and the weather will permit, outdoor exercises will be commenced.

In carrying out the prescribed drill the instruction is so arranged as to make each non-commissioned officer capable of drilling the entire detachment, and each private of drilling his own squad, explaining, when necessary, every movement before it is executed. After all parts of the prescribed drill system have been thoroughly learned, the arrangement of the various relief stations upon the

battlefield with the personnel and equipment of each is first taught in a series of lectures and recitations, and then practically illustrated. The man in charge of each station is given a paper containing a written statement of the personnel and equipment and of the duties to be performed at his post, were the proper quota under the assumed conditions present. The wounded, properly tagged with the nature and extent of the injury, are then distributed along the assumed fighting line and relief is afforded them, natural conditions, distances, etc., being carried out as nearly as possible. After all the wounded have been brought in, or have come in, and before the "first" dressings are removed, they are all inspected by the instructor, and errors explained and caused to be corrected by those that made them.

The ambulance should be housed near the hospital and a team of mules designated for the use of the hospital in emergency, this team to be subject to the surgeons' orders when not otherwise employed; then frequent exercises should be given in emergency calls, the ambulance fully equipped for service, turning out as rapidly as possible; it is astonishing how slowly this will be done the first time or two, and how quickly improvement is manifest.

FIELD EXERCISES.

Once every year the Hospital Corps detachment should be put in camp for the purpose of exercises under conditions as nearly like those of actual warfare as practicable. If there is a practice march from the post and especially if the command is camped with the National Guard, for purposes of instruction, the conditions are greatly simplified; if there is to be no practice march, then the entire hospital corps with all the sick under their charge should be put in camp near the hospital for a period of not less than ten days. The proper allowance of tentage and ambulances being on hand, wagons and mules are to be obtained from the quartermaster, with mounts for the men when practicable; on the day, and at the fixed hour, the wagons are carefully packed, the patients transferred to the ambulance, the detachment falls in, the whole is inspected, and then marched to the previously selected place of encampment; here the camp is made, the patients placed in the field hospital, and there-

after the post hospital is closed, and no one allowed to enter it without permission from the surgeon. Only the field equipment is to be used in camp; this rule should be strictly enforced, and the exercises are the same as those in a regular summer camp. These exercises should consist in frequent making and breaking camp, including the proper and systematic pitching and striking of tents, packing of wagons, transfer of patients, etc. Whenever the entire detachment is present, or the number of men is sufficiently great, all cooking for the detachment and patients is done by the Hospital Corps, and in all cases instruction is given in field cooking under varying conditions. Then operations in the field and preparations therefor; exercises in learning the contents and uses of the various field appliances. Each man in turn is required to promptly produce a certain medicine or instrument, and if it is duplicated in the equipment to tell where else it can be found. The contents of the various pouches, chests, etc., are removed, mixed and required to be properly replaced. Each man must be able to name at once everything in his personal equipment, and explain its use. In addition each is taught the principles of camp sanitation, including the sterilization and clarification of water, disposal of excreta, etc.

The extemporaneous preparation of litters and travois, and the fitting up of wagons, etc., for the transportation of the wounded is practically shown. If a pack-saddle is at hand, packing should be taught. Mules are attached to litters and travois, and their practical handling over all sorts of ground demonstrated.

A list of all the articles taken into the field is kept in a book, and when anything necessary is found to have been overlooked, or anything unnecessary to have been taken, it is noted for future reference.

The exercises in the establishment of the various stations, and relief of the wounded under the conditions of actual warfare are the same as those described in garrison, only on a more extended scale, going more into detail, and if possible in connection with the manoeuvres of the troops. Whenever the company bearers are available, a sufficient number of them act temporarily as members of the hospital corps, so as to give the detachment sufficient size to afford at least a working organization for the various stations;

the stations are properly selected with reference to shelter, roads, water, etc., and designated by the appropriate flags. Instructions are given in regard to leaving the dead and hopelessly wounded; in regard to directing to the field hospital those who can walk, affording such assistance only as they may actually require.

Everything being understood, the dummy wounded being in place, and the company bearers on the fighting line, the detachment, exclusive of those men designated for service at the field hospital, is formed—the first dressing station party on the right if there is to be a separate ambulance station—and the ambulances in the immediate rear of the detachment; as each station is reached the men previously designated for its service fall out, and after all the men have reached their proper places the signal is given, when each party begins the duty assigned to it. Company bearers render first aid and start back with the wounded as far as the first dressing station; here they stack their arms and take extra litters to continue their assistance as long as needed, provided they do not go beyond the first dressing station, or lose touch with their companies. At the first dressing station stimulants are given, dressings are applied and patients labeled if practicable. At the ambulance station the ambulances are drawn up in line facing to the rear, and one man has everything ready for a fire to prepare beef tea for use as a stimulant. Each man is examined as he comes in, and such further aid being rendered as he may require and the circumstances admit of, he is sent in the ambulance to the field hospital. At the hospital preparations are made to serve beef tea and coffee to patients who may need stimulation, and dinner to the detachment when their labors are over; the operating fly is pitched, tables prepared, instruments made ready, etc. As the patients are brought in they are arranged in two rows on either side of the entrance of the hospital, those badly wounded and requiring immediate attention on the right, the others on the left. The equipments of each man are carefully preserved and their shelter tents pitched in rear of the hospital to afford additional space for wounded. The field having been cleared of wounded, the medical officers visit each station, requiring the non-commissioned officer in

charge to recite the purpose and name of his station, its duties, personnel, etc.

At the field hospital the steward does the same, and details the reports and papers required from the field hospital after a battle and under varying circumstances. The several detachments are then called in and the dressings examined and errors explained in the presence of all, as detailed above. Exercises in searching for wounded at night by aid of lanterns should also be carried out, and the use of electrical and other means of illumination of the battlefield for this purpose should be fully explained. The probable large number of wounded after the battles of the future will render this night work very necessary and it should be prepared for. Evacuation from the field hospital to the general hospitals at the base must also be outlined, and the usual method of fixing up railroad cars and steamboats for this purpose taught. Empty supply wagons and freight cars returning from the front will no doubt be utilized for this purpose, and it would be well to have some sort of litter which could be elastically suspended and used in either wagon or car; something of the sort used in the German Army.

For the National Guard the theoretical instruction and drills with the litter can be carried out in the winter months; the practical course when in camp with the U. S. Army.

Company bearers as now appointed are unsatisfactory, and the fruits of their instruction disappointing. Men who take an interest in the work make great progress, while those who do not care for it are worse than useless. It is true they are selected "with the concurrence of the post surgeon," but in a post of any size the surgeon does not know the men, and must therefore usually "concur" in a perfunctory manner. It should be a prerequisite for appointment that the man shall have had at least one year's service in the line, and possess all the other requirements for membership in the hospital corps. Then let the surgeon have the power to have a man relieved from duty as company bearer whenever he shows his unfitness for the position by inattention, conviction of a military offence, or other cause, and require the company to furnish another man in his place until a satisfactory detail is made. Let the position of company

bearer be one of the rewards of merit, let no other duty interfere with his four hours per month special instruction, and then let transfers to the corps be made only from the ranks of the company bearers, so that it is understood that this position is a stepping stone to the Hospital Corps. To make the Hospital Corps more popular let each man prior to discharge be given a practical and theoretical examination in nursing and pharmacy, and if he shows a sufficient proficiency in either, give him an official certificate to that effect, so that should he return to civil life his training may be recognized and have a financial value.

THE PERSONAL EQUIPMENT OF THE SANITARY SOLDIER.

BY GEORGE D. DESHON,

Assistant Surgeon U. S. Army.

With a few technical modifications the equipment of the Hospital Corps of the United States Army is identical with that of the Infantry. Its weight (including half of a twenty-four pound litter) is a trifle more than that of the Infantry equipment.

The duties of the sanitary soldier, however, are in many respects more arduous than those of his line comrade, and his strength should, therefore, be more carefully husbanded. At the end of the day's march the infantryman wraps himself in his blanket and is lost to all his troubles, but the hospital man, who has tramped the same distance, must arouse his flagging energies, to nurse the sick in hospital, aid the footsore, and dispense medicines to the diarrhoeal cases straggling in to the dispensary, through the night, for treatment. In action, too, his physical endurance is taxed to the utmost in carrying the wounded back from the line of fire, often over long distances and rough ground.

It is evident then that the weight of his equipment should be the smallest possible, and that, when practicable, he should be furnished on the march with transportation either by wagon or horse. The non-commissioned officers and the medical officer's orderly are supposed to be always mounted. The remaining members of the de-

tachment must, of course, be mounted when serving with cavalry or light artillery.

The general requirements for an equipment then, are that it be of minimum weight and be equally adapted to the needs of the mounted man, the dismounted man, and the man riding in ambulance or wagon.

The present equipment of a private of the Corps consists of pouch, knife, belt, leggings, knapsack, haversack, canteen and cup. That of a non-commissioned officer is the same, except that a sabre is worn in place of the knife, and a package of dressings carried instead of the pouch.

It is the purpose of this article to show how this equipment may be simplified and better adapted to the requirements of the sanitary service. To this end each article will be discussed in turn.

THE HOSPITAL CORPS POUCH.

This pouch is twelve inches long, six and a half inches high, and four inches thick. It is worn suspended from the left shoulder to the rear over the right hip, except when open or when worn with the knapsack, when it hangs in front to the right. It is secured in position by two canvas loops, through which the waist belt is passed.

It contains the following:—One bottle of aromatic spirits of ammonia, four roller bandages, one candle in tin box, one Esmarch's First Aid package, one pair dressing forceps, one iodoform sprinkler, one jack-knife, one package of sublimated lint, one package of borated wool, one paper of medium needles, one box of carbolyzed petrolatum, one paper of common pins, six safety pins, one spool of adhesive plaster, one pair of medium scissors, two wire splints, two small sponges in bag, twenty yards of linen thread, and two field tourniquets.

The objections to this pouch are as follows:—It is difficult to slide the pouch from rear to front along the belt, and the loops are readily torn. If worn without passing the belt through the loops the pouch swings free from the body with every motion, and

is continually in the way. When carrying the open litter the pouch on the hip of the front bearer interferes with the litter sling or litter handle. When worn in front it impedes free movement in stooping and lifting the patient. The shape of the pouch is such that one portion of its contents cannot be reached without removing other portions. For example, the splints, which might be among the first things needed, cannot be obtained without removing a package of sublimated lint, a package of boric wool, Esmarch's First Aid package, a roller bandage, and a box of adhesive plaster. Several articles contained in the pouch are wholly unnecessary, while of the remainder several should be increased in quantity.

To meet these objections a first-aid carrier must be devised which will admit of rapid shifting of position, according to need, without inconvenience to the bearer; which will never impede his movements; which will be so constructed that its entire contents can be seen at a glance, so that any needed article may be instantly seized without displacing any other, and which finally shall contain only those articles required to control hemorrhage on the line of battle, and to apply temporary dressings at the dressing stations. The soldier of the Hospital Corps should be required to check hemorrhage, to cleanse wounds, when this is needed, to cover securely every wound with an antiseptic compress, to apply temporary splints to broken limbs, and to carry to the dressing stations patients unable to walk. Further treatment of gunshot injuries on the part of enlisted men can but be dangerous and should be strictly prohibited. Hence articles other than those required for these particular purposes are superfluous encumbrances.

The Hospital Corps soldier should carry two Esmarch's elastic ligatures. These are far superior to the field tourniquets now furnished, and which in the hurry and excitement of an action would be generally misapplied. He should carry a bottle containing fifty antiseptic tablets, an iodoform sprinkler, a dozen antiseptic compresses, ten antiseptic roller bandages, three triangular bandages, a spool of adhesive plaster, a pair of dressing forceps, a pair of scissors, a large clasp knife, a package of pins (common and safety), a bottle of aromatic spirits of ammonia, and material for

splints. The best temporary splint is made from wire screening. A strip three inches wide and four feet long can be rolled into a cylinder one and a quarter inches in diameter. Lengths can be cut from this as needed and readily moulded to fit any limb. Padding and other necessities must be improvised from the patients' clothing and equipment. The special training of the hospital soldier is largely to the end that he may be ready in invention, quick in emergency.

A similar and convenient way of carrying these first-aid appliances is in a belt made of strong duck or webbing, similar to the Mills Woven Cartridge Belt. It should be three and a half inches wide and should be provided with numerous pockets, each adapted in size to its individual contents, and no pocket containing articles of more than one kind. The top of the belt should be covered with a flap subdivided into sections, each subflap being secured by a snap similar to those employed as glove fasteners.

A belt illustrating these principles, in a general way, will be submitted to the meeting for its judgment. It was crudely made by workmen at a frontier post, and can, of course, be greatly improved upon by a competent belt-maker.

With its contents it weighs three pounds, thirteen ounces. The present pouch complete with belt and hospital corps knife weighs five pounds and eight ounces. The Mills Cartridge Belt, with its fifty rounds of ammunition, as worn by the soldier in the field, weighs six pounds, five ounces.

This proposed Hospital Corps belt presents the following advantage:—Simplicity, durability, and ease and convenience to wearer. It can be worn with any uniform, mounted or dismounted. It interferes with no other article of the equipment, and its contents are always available at a minute's notice.

It has been carefully tested in the field and in garrison and has been much preferred by its wearers to the pouch.

THE HOSPITAL CORPS KNIFE.

The present Hospital Corps knife is an encumbrance in the service of the litter. In raising the open litter either the scabbard of the front bearer catches on the litter handle, or his knife handle

catches in the litter sling. It is suggested that a jack-knife with a blade five inches long, carried in one of the compartments of the belt, would fulfill the double requirements of the Hospital Corps knife and of the small knife now carried in the pouch. It would be large enough to fashion splints from saplings and small branches.

Each ambulance should be provided with two hatchets, with which, in a country covered with thick underbrush, ground could be cleared for dressing stations. The cook carries in his wagon an axe for preparing firewood.

THE BELT.

The plain leather belt now in use should be retained for use with the full dress uniform on occasions of special ceremony, court-martial duty and the like. It could be designated the dress belt in distinction from the service or field belt just described.

THE LEGGINGS.

The present brown canvas leggings cannot be improved upon. They are equally serviceable for mounted and dismounted troops, and should always be worn.

THE KNAPSACK.

The one now in use packed according to the method prescribed in the drill regulations, weighs twenty-two pounds, five ounces. For reasons already mentioned the Hospital soldier should not be required to carry this burden.

When serving with Infantry his blanket, overcoat, and change of underclothing should be neatly and compactly folded in his shelter tent and transported by one of the wagons accompanying the ambulance train. The entire contents of the present knapsack can be rolled into an extemporized pocket in the shelter-tent half, forming a small bundle which requires no fastenings to hold it together. No knapsack of any description is needed. Should the means thus indicated become temporarily unavailable, he can wrap his clothing in his blanket, and this again in his shelter-tent, and, securing the ends, sling the roll thus formed over his shoulder, after the manner so common among old campaigners. Such an emergency will, however, seldom arise.

When serving with cavalry the blanket should be carried rolled and strapped to the cantle, the overcoat similarly fastened to the pommel, and the extra clothing in the saddle bags.

THE HAVERSACK.

The brown canvas bag employed to carry rations and mess kit meets all requirements and should be worn as now, slung over the right shoulder and hanging over the left hip, except when its wearer is mounted, when it should be stowed in the saddle bag.

THE CANTEEN.

No means is now provided the sanitary soldier for cleansing wounds covered with dust, grease and powder, such as he is likely to encounter along the line of fire. At slight expense an addition can be made to the present canteen which would be of great value in this respect. A basin of blue ware can be made which shall fit over the lower half of the canteen. Two springs on the sides of the canteen catching in a groove on the inner surface of the basin, will hold it firmly in place. Pressure on the springs will instantly release the basin, into which water from the canteen can be poured, an antiseptic tablet dropped, and a means is at hand for cleansing the wound before the application of the first dressing.

A canteen provided with a roughly constructed basin of this pattern is submitted for inspection. The basin is of tin. For actual use with corrosive solutions it should be made of blue ware as already suggested.

THE TIN CUP.

The one now issued for drinking purposes should be retained, and should be slung on the canteen strap, convenient for use, instead of being hung from the bottom of the knapsack far out of reach. The drinking cup should never be used for washing wounds, lest an antiseptic solution contained therein be inadvertently poured down the gullet of some unfortunate.

INDIVIDUAL LITTER SLINGS.

There should be issued to each bearer as part of his personal equipment, a litter sling whose length corresponds to his own size.

A button hidden under his blouse collar and slipped through a slit in the middle of the sling would prevent its riding upon his neck when stooping to raise or lower litter. When not carrying the open litter the ends of the sling can be secured by simply slipping them under the belt. The use of such a sling would dispense with the necessity of lengthening or shortening sling straps whenever bearers change posts, and would also do away with several movements in the manual of the litter which are at present exceedingly complicated.

The weight of this proposed equipment is as follows:—

	lbs.	oz.
Hospital Corps belt with contents.....	3	13
Canteen filled, with basin and cup.....	6	8
Haversack with mess kit.....	2	10
Litter slings.....		5
Leggings		9 1-2
Total	13	13 1-2

This weight as above distributed can be carried without fatigue. The weight of the equipment carried at present is thirty-five pounds, twelve ounces. This does not include, of course, the litter, which, it seems needless to say, should always be carried in racks on the outer sides of the ambulances, except when in actual use. Two or three litters can be easily carried on each side of an ambulance.

THE ORDERLY POUCH.

In the field each medical officer is accompanied by a mounted private of the corps, known as the Medical Officer's Orderly, who is provided with a pouch of dressings for the surgeon's use at dressing stations and on the march. This pouch is thirteen inches long, nine inches high, and four inches thick. It contains the following:—

One bottle of aromatic spirits of ammonia, two roller bandages, one pus basin, one medicine case, one elastic catheter, No. 8, one four ounce bottle of chloroform, one Esmarch's First Aid package,

one medicine glass, one box of carbolyzed petrolatum, one paper of common pins, six safety pins, one pair of scissors, two sponges in bag, one hypodermic syringe with tablets, one book of diagnosis tags with pencil, one Esmarch's tourniquet, one package of boracic wool, and one package of sublimated lint.

Of these articles the pus basin is neither useful nor ornamental, and may be omitted. So, too, may be the medicine glass, the carbolyzed petrolatum, and the sponges. Instead of the latter, pledgets of absorbent cotton should be used.

The medicine case holds six bottles containing respectively, acetanilide tablets, quinine tablets, cough tablets, compound cathartic pills, diarrhoea tablets, and antiseptic tablets. The two latter varieties are essential and should be retained. The others should be discarded. Men on the march are not in such desperate need of compound cathartic pills and cough mixtures that they cannot wait until reaching the ambulances, where the medicine chests are kept.

The hypodermic case contains the following tablets:—Apomorphia, ergotin, morphia, and morphia and atropia in combination. For the latter atropia alone should be substituted. The surgeon could then use atropia by itself when desired, or could combine it with morphia when needed. For the apomorphia, strychnia should be substituted.

In addition to the articles enumerated whiskey and iodoform should be carried.

In place of the one large pouch just described the orderly should carry two smaller pouches,—one filled with dressings, the other containing such other appliances and medicines as are necessary. These pouches should be slung one over the right, the other over the left shoulder, and secured by the leather waist belt, the objections to this arrangement for bearers not holding good in case of the orderly. The pouch hanging at the right hip should be designated pouch No. 1, and should contain bottles of whiskey (eight ounces), chloroform (four ounces), aromatic spirits of ammonia (one ounce), antiseptic tablets (fifty), diarrhoea tablets (fifty), an iodoform sprinkler, a hypodermic syringe and tablets,

a pair of medium scissors, a paper of pins (common and safety), a book of diagnosis tags with pencil, two Esmarch's elastic tourniquets, two roll splints, such as already described, and one elastic catheter No. 8. These should be neatly arranged in pockets along *both* sides of the pouch, so that no one article shall obscure or interfere with the ready removal of any other article.

The second pouch should contain forty-eight antiseptic compresses, twenty-four roller bandages, twelve triangular bandages, and two packages of absorbent cotton. Extra packages of dressings should, of course, be carried in the wagons, from which the pouch should be replenished as occasion might demand.

Besides these two pouches and leather belt, the orderly should be provided with canteen, basin, cup, haversack and leggings,—all to be worn in the manner already indicated. His blankets and extra clothing should be carried in the manner described for mounted men.

The non-commissioned officers should be equipped with saber and belt, canteen, basin and cup, haversack, leggings, and orderly pouch No. 1. The saber has been included through deference to the opinion held by many that the sidearm is a badge of authority which a non-commissioned officer should never be without. Its use is open to many objections, however, particularly in the field.

The pouch should be slung over the left shoulder, hanging in front to the right. The canteen and cup should hang in rear to the right. Blankets and clothing should be carried as above.

Little attention has thus far been paid by Medical Officers to the subject of providing their men with an equipment best suited to actual service. That an improvement in present methods can be obtained seems probable to all careful observers, and it is hoped that many valuable suggestions on this important subject may be made by the officers present.

[Discussion on Lieutenant DeShon's Paper.]

Capt. Standish:—Mr. President, I am very much interested in this service belt. It strikes me it is a move in the right direction. We have been all through the haversack

business. I have seen men turn everything out on the ground to get what they wanted. It seems to me that a service belt in that way is a great step in advance.

Major Hoff:—In connection with the equipment of the sanitary soldier, which is, of course, a question of the utmost importance, I might say that chance made me a member of the Equipment Board in 1891, which was organized to consider the whole question of sanitary equipment of the Military Department of the United States Army. Every data that we could get and all samples of equipment that were submitted or that we could find in any direction, both in the foreign armies and in our own, were considered by that board, and the boiled down result of that investigation, so far as the personal equipment of the individual soldier of the hospital corps was concerned, was this pouch. The pouch is not considered to be perfect, by any means, but it is a pouch which practically resembles the pouch carried by the English sanitary soldier, which has been in use in England for a good many years, which has covered practically all climes, and which has received the commendation of that service. Based upon that experience—and of course, we must have experience in all things—we accepted that pattern of pouch.

Now, when it came to the question of what should be put into that pouch, we duly considered the sanitary soldier of every army of which we had any record. We made parallel columns, putting down the equipment of each one of these sanitary soldiers, and then the board went from one column to the other, eliminated all they could, and took the best of the equipment. This pouch is the result of that work.

We have had the pouch in use since 1891. My own experience with it (of course one speaks more from his own experience, than he does from the experience of anybody else), has been very satisfactory, and my experience is that the hospital service has not been turned out without this pouch.

It was found that this pouch should be packed in a systematic manner, and the drill book of the United States Army contains a scheme for packing, and it is now a part of the instruction of the hospital corps. It teaches the men how to pack these pouches, and a part of the inspection of the hospital corps consists of an inspection of the pouches to see that they are properly packed.

The question of any belt in improving the equipment of the sanitary soldier I think is one worthy of the utmost consideration. As I said before, I do not believe the pouch as it stands now is by any means perfect, but I believe it is the most perfect apparatus that has been presented.

Capt. Standish: Mr. President, I can only say that I want if possible, the men to have an arrangement that will pack itself; we do not wish anything that requires to be unpacked to get anything that may be in it.

THE LATEST EXPERIMENTS ON THE EFFECT OF SMALL CALIBRE RIFLES.

A RESUME OF EXPERIMENTS OF PROF. KOCHER OF BERNE, THE GERMAN
COMMISSION OF BERLIN, AND PROF. DEMOSTHENE OF BUCHAREST.

BY MAJOR ALFRED C. GIRARD,

Surgeon U. S. Army.

It has been my desire to present before this meeting of the Association of the Military Surgeons of the United States a sequel to the report made by me at the Chicago meeting on the comparative effect of large and small calibre guns, and I regret very much not being able to do this in person and that I can only at this time submit in an abbreviated form the result of my inquiries on the subject while abroad. The reason is, that while I had repeatedly examined the specimens of Prof. Kocher's experiments and had his results explained to me by him, I had to await the delivery of his paper on the subject at the Congress in Rome, where also I heard the report of the German Commission and of Prof. Demosthene of Bucharest.

The short time available between the sessions of the Congress and the mailing time of my report in order to reach your meeting, and the inconvenience of doing literary work while traveling, prevent my making a full report to your meeting.

EXPERIMENTS OF PROF. TH. KOCHER, AT BERNE.

Introduction.

The experiments were made with various weapons and projectiles at reduced distances. Formerly from 8 to 30 meters, of late years the distance has been uniformly 10 meters.

The weapon used with the older experiments was the Vetterli, cal. 10, 4, in the later ones the Schmidt, model 1889, cal. 7, 5. Some experiments were made with a Schmidt, cal. 6. For the greater velocity the ordinary charge of the gun was used, giving in the Vetterli an initial velocity of 425 m., in the Schmidt, 600. The shots of 425, resp. 600 velocity are therefore to be considered as short range ones with the ordinary charge. In order to imitate greater distances the charges were reduced.

Methods of Experiments.

The purpose of these experiments was a two-fold one: First to investigate in a general way the effects of the projectiles and to reduce them to specific laws, and second, to ascertain the effects on the human and animal body.

For the first purpose the firing was made on glass, rosin, metal, stone, clay and soap plates; also on tin cans with various contents, and on dried bones, etc. In the experiments for the second purpose fresh bones, animal flesh and human cadavers were employed.

Results.

The results are also divided into two categories: Those relating generally to the effect of gun projectiles and those relating to animal tissues.

The following are the main results of the theoretical experiments:

1. We find in great velocities (consequently at short range) a more or less pronounced lateral effect—a transmission of the live

energy—even in dry, brittle substances, without rotation or deformity. This effect is commonly called *explosive*. The proof that neither rotation nor deformity were instrumental in these explosive effects is furnished by control-experiments with round bullets, without rotation and with projectiles not subject to deformation (steel), in which the explosive effect is very pronounced. (See Fig. 1-6, glass plates with explosive effect.) This centrifugal transmission of energy is well illustrated by the experiments with tin cans filled with marbles, where the marbles made impression on the tin in every direction, even that of entrance and on themselves. (See Fig. 7.)

In the experiments on plates we find this lateral transmission of energy radiating from the entrance opening perpendicularly to the diameter, showing a greater defect at the exit. (See Fig. 8.)

We find a much larger channel than the diameter of the projectile, no matter what the deformity or lack of deformity may be, when delivered with great velocity.

2. In reduced velocity (practically greater distance), there is a zone, in which we find smooth perforations with very little lateral effect. In glass plates this zone exists for a velocity of 250-400 m. (corresponding with full charge to a distance of 1100-400 m.) In dry bones this zone extends much further, for even at short range we obtain smooth perforations without explosive effect. Likewise one of the preparations, a dry diaphysis of femur, shows with a velocity of 750 m. (increased charge) a simple perforation without fracture.

3. In still more reduced velocity, corresponding to increased distance (in the experiments of glass plates, velocity of 250 m. or distance of 1100 m. with full charge), the live energy is not sufficient any more for a smooth perforation, and lateral effects make their appearance which greatly differ from the explosive effect and rather resemble a blow with a blunt instrument (both radial and concentric cracks in the glass plates). In substances not brittle the projectile simply fails to perforate.

4. The explosive effect, *ceteris paribus*, is increased by the presence of fluids in the experimental bodies. Thus a tin can filled with water is torn to pieces by a shot with high velocity, while an empty can shows a simple perforation. The same obtained with

PLATE I.

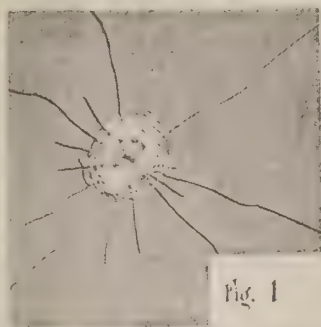


Fig. 1



Fig. 2

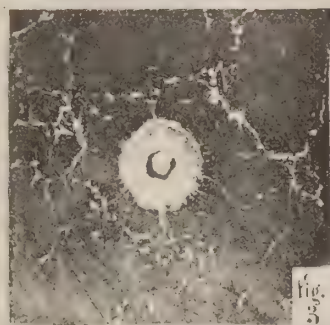


Fig. 3



Fig. 4

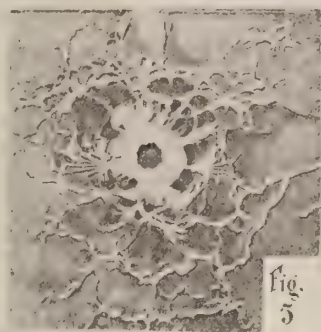


Fig. 5

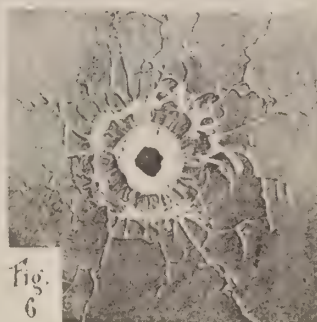


Fig. 6

a tin can filled with moist cotton, compared with one filled with dry cotton (see Figs. 9, 10, 11, 12). With reduced velocity, i. e., increased distance (velocity from 250 m. downwards, i. e., 1100 m. distance upwards), we find a simple perforation, even in a can filled with water. In semi-solid bodies we observe simple perforations under reduced velocity; with increased velocity the lateral effect (explosive) makes its appearance and increases progressively, in soap commencing with 100 m. (See Figs. 13 and 14.) The explosive effect is remarkable in large lumps of clay, even with steel projectiles, not subject to deformity. (See Fig. 15.)

5. The following results were shown in the effect on the animal or human body. (a) The soft tissues exhibit a decided explosive effect. In the liver, e. g., we find pulpification of the tissue even at a velocity of 300 m. (distance of 700 m.) At short range the destruction is great. Muscular tissue suffers less destruction, even at short range, with non-deforming projectiles, more with deformed ones. Reduced velocity produces simple perforations. (See Fig. 16.) (b) The following are the results in the skull: When empty and dry we never find explosive action, even at short range—the perforations are always smooth. (See Figs. 17 and 18.) When, however, filled with a semi-fluid mass (brain or potato pulp), it already shows explosive effects with a velocity of 250-300 (distance 700-1100), very pronounced in shots at close range (velocity of 660 m.). With reduced velocity we again find simple perforations, or the projectile remains in the bone. (See Figs. 19, 20.)

(c) In the extremities we have to distinguish between the diaphysis and the epiphysis. In moist epiphyses at much reduced velocity the projectile is arrested (see Fig. 21); in somewhat higher velocity (medium distance) simple perforations (see Fig. 22), and in high velocity (close range) greater defects, with fracture and disruption (see Figs. 23 and 24). Dry epiphyses, even with highest velocity, exhibit simple perforation (see Fig. 25). The moist diaphyses show with low velocity (up to 150 m., i. e., distance of more than 2000 m.) long fissures. The greater the velocity, i. e., the less the distance, the more the effect is concentrated on the point of entrance, the perforation combining with splintering, the effect in

PLATE II.

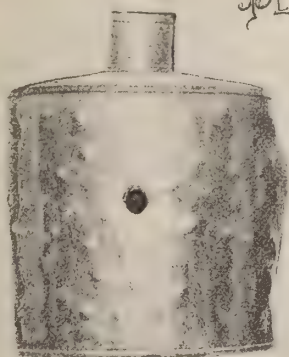


Fig. 7



Fig. 8

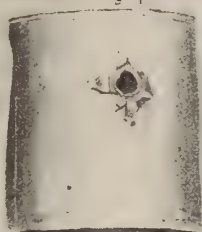


Fig. 9



Fig. 10



Fig. 11



Fig. 12

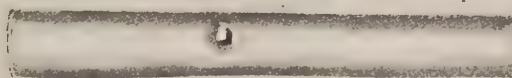


Fig. 13

medium distances (velocity of 300 m., distance of 700 m.) exhibiting a smaller number of relatively large splinters, while in higher velocity (600 m.) we find complete comminution at the point of impact. (See Figs. 25—30.) In dry diaphyses we notice occasionally simple perforations even with high velocities.

(d) As to the effect of the material of the projectile, it is shown, that those which are least subject to deformation cause great explosive effects at high velocity (steel). Of course a number of the preparations show a very decided explosive effect with soft projectiles, as they are flattened in impact and have, therefore, a greater diameter.

This is about the substance of Prof. Kocher's view, and results of his experiments.

EXPERIMENTS OF VON KOLER AND SCHJERNING.

Methods of Experiments.

Always full charge (initial velocity of 640 m.) on distances of from 25 2000 m. corresponding to velocities of about 600–170; calibre 7, 9. The proper proportion of moisture in the cadavers used for the experiments was supplied by injection of fluids. The wound channels were filled with casts of fused Wood's metal.

(a) On the Projectiles.

1. EFFECT ON THE PROJECTILES

Deformation of the projectiles was greatest at short range and continued up to 1600 m. At greater ranges the projectiles were only slightly flattened. No deformation by impact on soft tissues, only on bones. In deformation the injuries are more severe.

2. PERFORATION AND ARREST IN THE BODY.

The projectiles were rarely arrested and only at the greatest distance; at times some part of the jacketed bullet is arrested.

3. LATERAL IMPACT AND ROTATION.

Lateral impact causes greater destruction. This frequently takes place in the body owing to unequal resistance; and when the projectile retains a great amount of live energy it acquires a pendulum-like motion, resulting in great destruction of muscles and soft parts.

PLATE III.

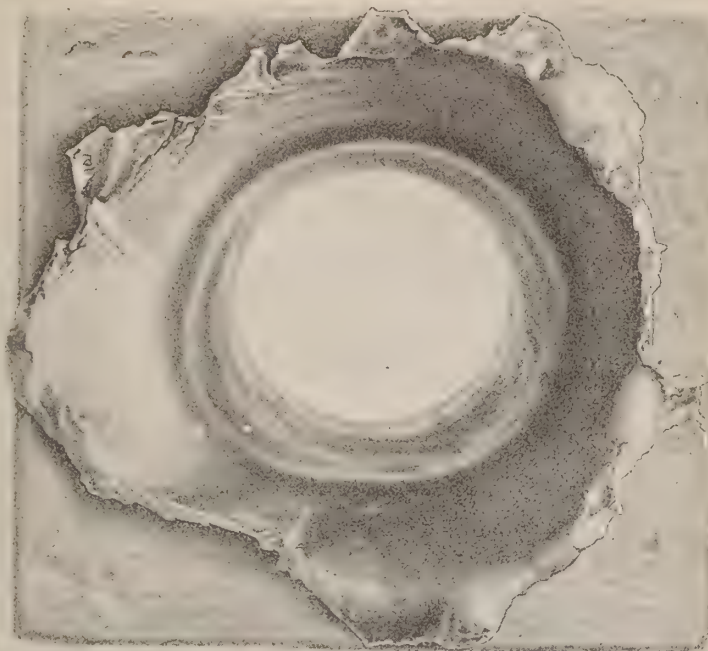


Fig. 14



Fig. 15

4. THE TEMPERATURE OF PROJECTILES.

By filling the jacket with a metallic compound, subject to fusion at a temperature of from 65-197 deg. C., it was proven that the projectile is only heated above 65 deg. when a number of consecutive shots are rapidly fired from the same gun. (In 100 shots in $2\frac{1}{2}$ minutes increase of temperature to 334 deg.) The projectile is heated to not more than 65-95 deg. C. in its passage through the human or animal body.

(b) *Effects of Projectiles.*

Division into zones is not justifiable, since the transition of the various effects is a gradual one, and the resistance of the different parts of the body and tissues alter it in every instance.

WOUNDS OF ENTRANCE OF THE SKIN.

Greater at short ranges, mostly smooth, largest in lateral impact.

WOUNDS OF EXIT OF THE SKIN.

Greater than the corresponding wound of entrance and more irregular. At close ranges they are very large, when a bone adjacent to the skin has been comminuted.

WOUNDS OF SOFT PARTS.

In muscles, smooth, straight wound channels, at close ranges somewhat larger, or at least as large as the calibre; at great ranges smaller. Greater destruction occurs only when the projectile meets resistance, is turned or strikes with lateral impact. The smaller blood vessels are torn, the larger ones seldom hit. When they are struck the injury to the intima is greatest. Complete division of larger vessels only at close range. In the heart we find simple perforations in systole, extensive destruction in diastole.

The lungs exhibit a narrow wound channel, the walls of which are infiltrated with blood. Result generally favorable, generally with pneumothorax; in 57 per cent. of the cases observed hemoptoe.

The liver is always greatly destroyed, extensive pulpification at close ranges. Explosive action evident yet at a distance of 2000 m. (velocity of 170 m.)

The spleen suffers in the same manner.

PLATE IV.

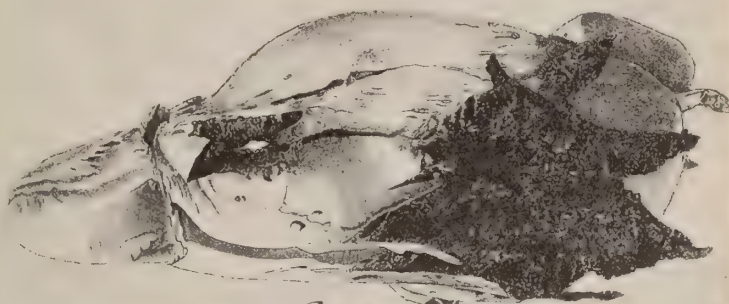


Fig. 16



Fig. 17



Fig. 18

Stomach, intestinal tube, bladder: In penetrating abdominal wounds on an average 3, maximum 8 perforations, size and form of intestinal wounds vary. (Cases of such injuries among the living always fatal.)

GUNSHOT WOUNDS OF THE SKULL.

Explosive action (transmitted by the substance of the brain) at close ranges, generally decreasing with increased distance. At a distance of 1600-2000 m. (velocity of 200-170 m.) simple perforations; and finally at a distance of 2700 m. arrest of the projectile in the cranial cavity.

Empty skulls exhibited at all distances simple perforations, without explosive action. Skulls filled with water or starch pulp suffered similarly to those filled with brain. A skull filled with brain, perforated with reduced charge, is said to have exhibited a simple perforation with a velocity of 300 m. corresponding to a distance of 700 m.

The brain is extensively destroyed in shots at close range; at longer ranges the wound channel is narrow.

EFFECT ON BONES.

At a distance of 100 m. (566 m. velocity) the diaphyses are comminuted into small fragments, the epiphyses likewise, sometimes with some cohesion by means of the periosteum.

The same results at a distance of 200 m. (500 m. velocity), with less destruction of the soft parts.

At 600 m. distance (319 m. velocity) the diaphyses were splintered, epiphyses sometimes simply perforated. Destruction of soft parts less severe.

At a distance of 800 m. (284 velocity) the epiphyses showed more simple perforations. At a distance of 1000 m. (260 m. velocity) diaphyses fractured in larger fragments; epiphyses, perforations. At 1200 m. distance (240 m. velocity) diaphyses still fissured, but less severely. Injury more severe at exit.

At a distance of 1600 m. (200 m. velocity) fracture of diaphyses, fragments held more together by the periosteum.

PLATE V.



Fig. 19



Fig. 20

At 2000 m. (170 velocity) the diaphyses are still fissured, but the fragments remain in place, the periosteum having suffered but small lesion, although at times fragments are detached.

Thus far the report of the German Commission at the Congress.

I will now give a resume of an address made by Prof. Demosthene of Bucharest at the Congress. A full report of his experiments will be made later.

He stated that the weapon he used was a 6.5 Mannlicher and claimed to be the first who had made experiments with full charges at actual distances since the introduction of small calibre rifles. A preliminary report of his had appeared in the "Semaine Medicale" of 1893. The distances fired at were from 5 m. to 1400. He finds that the effects of the jacketed small calibre projectile are much more destructive than had been generally believed; that all bones were fractured, not only perforated, at all distances; that neither the skull nor the diaphysis of the long bone presented simple perforations; that the bullet causes severe hemorrhages, and on striking bones may be so shattered as to send sharp particles into the adjoining tissues; and that for these reasons, as well as for the increased range, the small calibre rifle is more destructive than the older arms with leaden bullets.

I have not yet been able to obtain the full report in printed form published by Prof. Demosthene, but will embody a review of it in the paper I hope to prepare on my return.

I will conclude with a short comparison of the results attained by Kocher at reduced distances and with generally reduced charges, and those of the German Commission.

The Germans used full charges at actual distances, while Kocher employed full charges only for the great velocities, always at reduced distances of 10 m., while in all other experiments he reduced the charge in the usual manner. Thus his series exceeds the distances at which the Germans were experimenting; being able to observe effects at a velocity of less than 170 m. or actual distance of over 2000 m. at which distance it was practically impossible for the Germans to obtain results, while the range is still important in actual warfare.

PLATE VI.

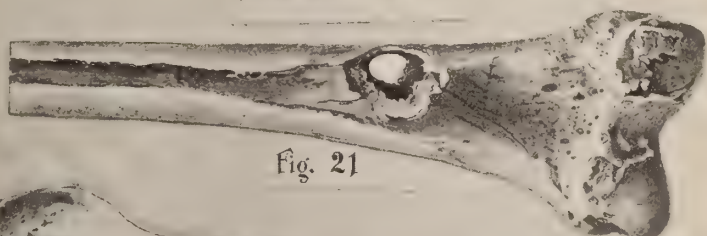


Fig. 21

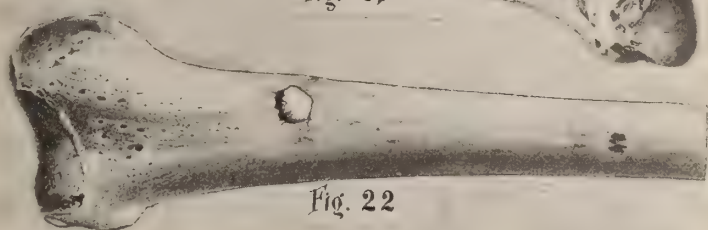


Fig. 22



Fig. 23



Fig. 24

(In reporting on the German experiments, which give only the distances, I have approximately computed the velocities for easier comparison with Kocher's experiments.)

Although Koler and Schjerning claim a difference in the effect of reduced charges, it is not sufficiently great to vitiate the value of Kocher's experiments. It is possible that the more severe effects generally obtained by the Germans are due to an impact not absolutely perpendicular, thus not only causing a lateral transmission of energy, but a real lateral impact. This may be produced during the long flight of the bullet, which is naturally easily affected owing to its length by unequal atmospheric currents, by possible unequal filling or inequality of rifling at the muzzle, so minute as not observable with the eye, but sufficiently to lead to a more or less pronounced tilting. The Germans observe no tendency to deformation of the bullet on striking soft parts, such as liver; still it exists, as is well shown by Kocher's experiments on livers, muscle and water, with soft projectiles, and will practically come into play in case of weakening or injury to the jacket.

An arrest of the projectile occurs frequently according to Kocher in velocities below 100 m. (especially in shots on epiphyses), consequent at the end of the trajectory, which is of practical importance. Since the German experiments terminate with a velocity of 170 m., they naturally find arrest more rarely than Kocher. (See Table XI.)

The explanation of the explosive effects by oscillating motion of the bullet on striking, while plausible, is rather set aside by Kocher's experiments on lead, rosin and soap, which tend to prove a simple transmission of energy.

The results on the skull are generally identical. The fact that a filled skull, in the experiments of the Germans, with reduced charge at 700 m. presented a simple perforation, need not necessarily vitiate Kocher's experiments, since he obtained with the same velocity (300 m.) an entrance perforation with extensive radial fissuring, while the exit showed marked explosive comminution.

While Kocher finds simple perforation as a rule in dry epiphyses, and frequently in dry diaphyses, the Germans find no difference.

PLATE VII.



Fig. 25

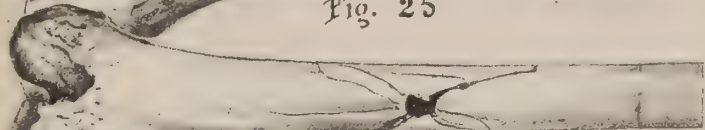


Fig. 26

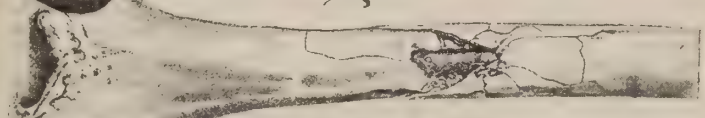


Fig. 27

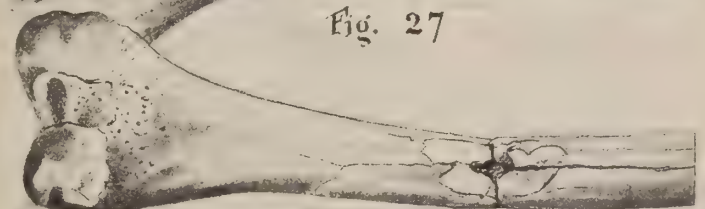


Fig. 28

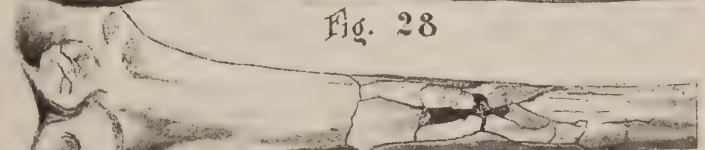


Fig. 29

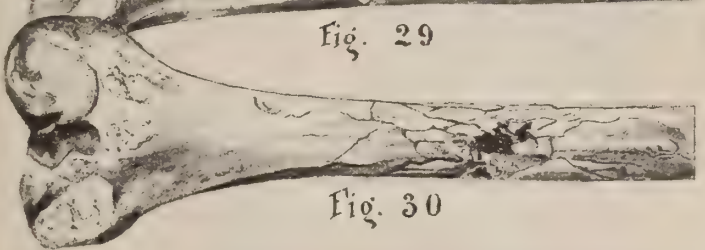


Fig. 30

The results in experiments on the extremities are about identical as far as the moist bones are concerned, which practically is of principal value, but here also the zone of least velocity is absent in the German experiments, Kocher reporting fissures in the diaphyses, and sometimes arrest in both epiphyses and diaphyses. It is evident from both series of observations that the more humane effect of the modern small calibre rifle with high velocity is unfortunately a myth, and that, with the possible exception of slighter muscle injuries, we will have in the future to encounter more severe injuries to the bones, and on account of its greater range a greater number of injuries. If there is a range at which the lesions are relatively less severe, it will be found at a range of between 700 and 1100 metres.

Note.—I have selected for photogravure a few of the most striking pictures from a series entrusted to me by Prof. Kocher. This series represents the illustrations which are to accompany his report on his experiments, of which he gave an extract, with exhibits of the preparations, at one of the general sessions of the International Congress at Rome.

An atlas of photogravures was distributed by the members of the German Commission, representing results of their firings, with full description. The copy in my possession will with pleasure be loaned to any member interested in these experiments, but I believe that copies can be obtained from the German War Department on application.

EXPLANATORY TEXT FOR PLATES.

Experiments on glass plates 3 m.m. thick, showing effects at the several velocities, irrespective of quality of bullet.

Plate I.—One-fourth natural size.

Fig. 1. Copper jacket. Cal. 7, 5. Vel. 100 m.

Fig. 2. Copper jacket. Cal. 7, 5. Vel. 250 m.

Fig. 3. Hard lead, steel point. Cal. 7, 5. Vel. 595 m.

Fig. 4. Round ball of wax. Vel. 425 m.

Fig. 5. Round ball of lead. Vel. 425 m.

Fig. 6. Round ball of iron. Vel. 425 m.

Plate II.—One-third natural size.

Fig. 7. Tin bucket filled with marbles. Steel jacket, 7, 5. Vel. 595 m.

Fig. 8. Lead plate. Steel pointed bullet, 7, 5. Vel. 600.

Fig. 9. Tin bucket filled with dry horseflesh. Lead bullet. 10, 4. Vel. 425.

Fig. 10. Tin bucket filled with dry cotton. Lead bullet. 10, 4. Vel. 425.

Fig. 11. Tin bucket filled with moist cotton. Lead bullet. 10, 4. Vel. 425.

Fig. 12. Tin tube filled with water. Hard lead. 7, 5. Vel. 595.

Fig. 13. Tin tube filled with water. Hard lead. 7, 5. Vel. 150.

Plate III.—

Fig. 14. Soap plate. Hard lead. 7, 5. Vel. 595. (One-half natural size.)

Fig. 15. Piece of clay, cut in two, showing the channel made. Steel jacket. 7, 5. Vel. 500. (One-tenth natural size.)

Plate IV. Showing injury to liver and to two empty sections of skull placed over each other.

Fig. 16. Liver. Steel pointed bullet. 7, 5. Vel. 590.

Fig. 17. Empty skull. Entrance opening. Copper bullet. 10, 4. Vel. 400.

Fig. 18. Empty skull. Exit opening. Copper bullet. 10, 4. Vel. 400.

Plate V.—

Fig. 19. Skull filled with potato pulp. Lead. 10, 4. Vel. 435. Entrance.

Fig. 20. Skull filled with potato pulp. Lead. 10, 4. Vel. 435. Exit.

Plate VI.—

Fig. 21. *Dry* femur. Diaphysis. Lead. 10, 4. Vel. 50. Entrance.

Fig. 22. *Dry* femur. Diaphysis. Lead. 10, 4. Vel. 50. Exit.

Fig. 23. *Wet* Tibia. Epiphysis. Copper. 10, 4. Vel. 435. Entrance.

Fig. 24. *Wet* Tibia. Epiphysis. Copper. 10, 4. Vel. 435.
Exit.

Plate VII.—

Fig. 25-27. *Wet* femur. Steel jacket. 7, 5. Vel. resp. 150.
300, 590. Entrance.

Fig. 28-30. *Wet* femur. Steel jacket. 7, 5. Vel. resp. 150,
300, 590. Exit.

THE RISE OF THE MEDICAL DEPARTMENT OF THE NATIONAL GUARD OF PENNSYLVANIA.

BY MAJOR WILLIAM H. EGLE,

Surgeon N. G. of Pennsylvania.

Although the subject of this paper may not be connected with the line of thought expected by members of this Association, yet as a brief resume of what has been accomplished by a branch of the National Guard of Pennsylvania so tenderly in touch with a similar arm of the Union service, the facts here presented will prove at least interesting if not medico-chirurgically valuable.

During the progress of the War for the Union, the State of Pennsylvania, at the darkest period of that conflict, placed her entire militia on a war footing. The law of 1864 organized companies, regiments, brigades and divisions. The constant drain of men up to the close of that year precluded any possible organization whatsoever, while during the last days of that fratricidal strife, there was little of the martial spirit of 1861. At length in 1867, greater interest was manifested and measures taken to the raising of an effective military corps. The history of the National Guard, however, commences with the modified military law of 1870, when it was constituted by name, and instead of twenty divisions, one more was added making twenty-one, and yet the entire number of troops did not exceed 15,000, officers and privates. Of these, less than a dozen medical men—the present Surgeon General of Pennsylvania, Col. Read, and the writer alone remain to speak of the ups and downs, trials and vexations—and yet the indomitable will and perseverance which has brought the Medical Department of the National

Guard of Pennsylvania up to its present high standard. If I am reminiscent more than instructive, you will pardon the inherent prerogative of a historian.

Fortunately, without exception, the ten or twelve surgeons commissioned, had seen active service in the war—they knew something of the duties devolving upon them. Yet, these were times of peace, and the medical officers were only seen at review on the day of the annual inspection, and thus looked upon as merely ornamental. Perhaps so, but their time had not come yet.

The next year a riot broke out in the Anthracite coal regions, and the Ninth Division, consisting simply of about five companies was called into service, remaining nearly six weeks. It was a bloodless war, but the Division Surgeon, who was the only medical officer attached thereto, furnished his own medicines, instruments and surgical appliances, relying upon the State for reimbursement, which was done in due time.

In the summer of 1872 occurred the "Saw-dust" war, so-called from the fact that the troops were summoned to protect the lumber mills at Williamsport, on the Susquehanna. Summoned at an hour's notice, the Surgeon of the Fifth Division had but little opportunity for collecting medical supplies. Relying upon his private medical case, a few bandages and lint, with his pocket case of instruments, he went to the field of war at the dead hour of night, not knowing how many wounded might need his services at early dawn. Fortunately no one was hurt, but a three weeks' encampment, with "headquarters at the Herdic House," and all the drug stores offering to compound the prescriptions gratuitously, one surgeon filled all the requirements of medical attendance, especially when the physicians of Williamsport kindly offered their professional assistance, should emergency require.

At this time, organizations into regiments were effected. Prior thereto, except in the City of Philadelphia, nothing of the kind had transpired, and regimental surgeons with an occasional assistant surgeon were appointed. The Medical Department was looking up.

It was not until the Centennial year, 1876, that the first encampment of the National Guard of Pennsylvania was held, in Fairmount Park, Philadelphia. Notwithstanding the inducement of the oppor-

tunity thus afforded in seeing America's Centennial Exposition, the attendance was small, of officers, as well as men—there was no law compelling this—and the whole thing was a failure from whatever point viewed. In three regiments one medical officer did the entire duty, furnished all the medicines required in camp, and if the patient had no money to procure the filling of a needed prescription, the Surgeon's purse was drained.

In July, 1877, the great railroad riots called out the entire National Guard of the State. Under the revised military law, the regimental organizations were better, the divisions fewer, and although at least one medical officer had been appointed to each command, the suddenness of the call, left some of the regiments without a surgeon or an assistant surgeon. Happy were they who had both. As yet no Hospital Stewards had been appointed, and as surgeon of a regiment in the organization, I made the appointment of one, but the medical stores were from my own supply, and one surgeon at least, was happy in the thought that during the three weeks' tour of duty, every man was properly taken care of and nothing lacked in medical or surgical oversight. At this time the question of rank was permanently settled—the date of original appointment outweighing the number of regiment or the date of commission of the commanding officer. Thus, although the colonel of my regiment was the junior one at this particular encampment my priority of commission gave me rank as chief medical officer of the entire command. Every precaution was taken to preserve the health of the men and minister to their physical comfort, and, when the war was over, few, if any, felt the ill effects of exposure subjected to during that tour of active field service.

The railroad riots of 1877, however, demonstrated one thing: That what was needed in the National Guard, was entire re-organization of the force in every department. Accordingly, a law was framed and enacted, forming one division and three brigades, with a full complement of medical officers, adopting the United States uniform for the entire Guard, and providing for annual encampments of from six to eight days, the men being paid for such service at least five days, subsequently for the entire period. The variegated Joseph-coat of many colored dress, heretofore used in the Guard,

was relegated to the decade prior to the Civil War, when the volunteer militia and "the rag-tag and bob-tail" on "Battalion Days," vied with each other in the splendor and tinsel of uniform. Unservicable, the three weeks' encampment played havoc with the gaudy dress coat and striped trousers. As sorry a looking soldiery was never seen on Pennsylvania soil as did these many commands, whose bright uniforms on previous street parades made the wearers the admiration of the female portion of the community especially.

Take it all in all, much was gained, but it was gradual, step by step. The Medical Department, under the direction of Surgeon-General Read began to assert itself. As coadjutors, all of the chief surgeons had served in the war, some with distinguished ability, and there was invariably hearty co-operation and good feeling. The first encampment proved successful, but the interference of the military impeded, if it did not in some instances, hinder the work of the surgeons. Notwithstanding all the disadvantages, the Medical Department was ever alive to whatever would tend to camp hygiene, to the comfort of the men, and the proper direction of the sick and wounded.

In later years, the annual encampments have been held principally at Mt. Gretna, a high point of land or range of the South Mountain, in Lebanon County, thirty miles southeast of Harrisburg, and in direct communication with both the Pennsylvania and Reading railroad systems. Ten miles distant from a large town, hemmed in by hills, the surface of the ground undulating, drainage good, it can scarcely be wondered at that Mt. Gretna—in addition to its pure air and abundance of mountain spring water—has proved to be the best camping ground in the Union. When to this we have the vigilance of medical officers looking to the sanitation of the camp, the cleanliness of the men (the bathing facilities being ample), it may still be surprising that the total number, during an entire eight days' camp, unfit for duty, has been only thirty out of an aggregate of nearly nine thousand men? And yet it is a remarkable fact, that it was brought about solely through the excellent work of the Medical Department.

At the first encampments, details were sent two or three days

in advance—some were there on Monday, when the canvas was not directed to be on the ground until Thursday, and the troops not to arrive until Saturday morning. These men would lie around in the woods by day and go to the nearest town in the evening, and, by the time the various regiments reached camp, as a general thing, they were unfit for duty; and these made up the majority on the sick list. This was changed. Prior to the encampment, the ground having been surveyed and laid out, the sinks are dug at once, with posts surrounded by canvas, two yards in height, the ground plan somewhat resembling a section of the so-called "Walls of Troy." These insure secrecy, as well as cleanliness around the camp. It is an improvement over the old plan where the tents of officers and men are first pitched, and that day and the next, which is generally Sunday, are allowed to go by before proper attention is paid to the cleanliness of the surroundings. With the erection of the kitchens, the sinks for the offal are dug, and these on a line generally with the outer sinks, so there is no danger on a dark night for anyone to stumble into them.

Instead of the old plan of having the water carried or hauled from springs and contiguous streams, the supply is brought to the camp in pipes from a distant reservoir, with sufficient fall to enable the water to reach the highest point in the encampment. These pipes with proper hydrants run in the rear of the kitchens with drains leading from thence to the sinks. Considerable attention is paid to the management of the kitchens; and especially to the preparation of the rations, these being similar to those furnished the United States Army, with an increase possibly of one-third more, as it has been fully demonstrated that during the first week of the encampment men consume from one-third to one-fourth more food than during the second or subsequent weeks. It may be here stated that the ration issued to the N. G. of P. has proved the best for the health of the men and to this may be greatly attributable the few cases of diseases complained of as so prevalent in other National Guards.

Long before the organization of the regular Hospital Corps, which is now a prominent feature of the Medical Department of the

N. G. P., at all drills by regiment or brigade, or at reviews, the litter or stretcher-bearers, selected by special detail, followed their commands accompanied by the Hospital Steward, with such medical and surgical supplies as were mostly needed in cases of emergency. At the Garfield Inauguration the appearance of the litter-bearers in the rear of each Pennsylvania regiment was not only a surprise but highly commented upon by military surgeons who witnessed it. These, however, have been superseded by the Hospital Corps proper, and although men are detailed regularly for this purpose, it is more than probable that in the future these will be regularly enlisted for this duty solely.

The litters in use in the National Guard of Pennsylvania are those adopted by the medical Department of the United States. They combine all the good features of the German, English and French litters, and I cannot but express surprise that an effort has been made at this session of the Association to adopt a litter which the National Guard of Pennsylvania discarded twenty years ago, and which is now to be found only in some antiquarian museum.

Shortly after the organization of the State Board of Health of Pennsylvania, a committee from that body visited the Division encampment at Mount Gretna, armed with a certificate from that Board directing them to make certain inspections of the camp, of the food, the clothing supply, the cooking, and of everything that had always been attended to by the Military Surgeons, and all this was to be accomplished in the space of two hours' time! Acting then as Surgeon-in-Chief of the Division, I refused to recognize any interference by the State Board of Health. They were informed that one-half of the surgeons had been in service during the War of the Rebellion, that they knew somewhat about camp-life and camp hygiene. Here was a committee, none of whom had even "snuffed the battle from afar," who knew nothing at all about the sanitation of a military camp, except as was promulgated in a circular issued by that body, suggesting "the planting of sun-flowers around the entire camp," as an important sanitary measure, although the medical officers never knew where they might encamp—the precise location—until a few weeks previous thereto, and they were to instruct the medical department of the Pennsylvania National Guard. The gentlemen were informed that

no interference would be tolerated, nor would they be recognized, and, yet, they were perfectly welcome as individual citizens of the State, to accompany me through the encampment, view its sanitary condition, see how the cooking was done, and inquire into all the details relating thereto. Wisely, they conclude to take a survey of the camp, and that was the last visit we had from that body. If the Military Surgeons of the National Guard are not able to attend to the healthfulness of the men and the sanitation of the camp, so as not to necessitate the intermeddling of the State Board of Health, or any other Board designated for that purpose, the sooner those surgeons get out of the service, the better, for the men and for themselves.

While upon this subject it may be interesting to note that, several years since, during the regimental inspection of an encampment, upon proper military authority, some of the officers attempted to have those of the sick who were in hospitals, taken to the front so as to answer to their names. This fact coming to the knowledge of the Surgeon-in-Chief, an immediate stop was put to the whole proceeding, and, calling together the surgeons of the Brigade, informed them they had absolute authority over the sick in the hospital and that under no circumstances could there be any interference with that right. It was never attempted again.

The daily routine of the Medical Officers of regiments or battalions, may be summarized as follows:

Sick call, generally at 7:30 a. m., followed by the reports from the Surgeons to the Company Commanders, of those who returned to duty, sick in quarters, or removed to the hospital, the morning reports of the sick and of the sanitary condition of camp, made out and forwarded to the Surgeon-in-Chief of the Brigade, and if, in Division Encampment, after being consolidated, sent to the Surgeon-in-Chief of the Division, who consolidates the Brigade reports for the Surgeon-General. After these matters are attended to, one of the Assistant Surgeons, acting as Medical Officer of the day for his command, superintends the policing of the kitchens and the sinks. The other assistant attends the Hospital Corps to the drill ground, whether of regiment or brigade. At noon comes the inspection of the kitchens, as also the cooking and its preparation. In the after-

noon the Hospital Corps is put through their manual drill, according to that promulgated by the Medical Department of the United States, including also instructions as to the first aid to the injured, etc., and with the appearance of the Brigade Medical Officer of the day, one of the Surgeons accompanies him through the regimental camp. This officer makes his report each day to the Surgeon-in-Chief of the Brigade, who, if there is any lack of duty on the part of the Military Officers, immediately directs attention to the matter. It will thus be seen that the medical officers are on constant duty. It is no pic-nic for them. There seems to be very little relaxation therefrom, although it must be confessed that by their constant endeavors to perform thoroughly the duty devolving upon them and assigned to them, the cases of sickness are remarkably few in number or seriousness.

Since the last brigade and division encampments of the N. G. of Pennsylvania, transpired the riotous outbreak at Homestead in the summer of 1892. The encampments of 1893 being regimental and of little account, either in a medical or military point of view, the State could do no better than abolish them. The Homestead affair showed to the country and to the world at large, how rapidly the National Guard of Pennsylvania can be mobilized—how effective its organization in every department, and how thorough its discipline. There was no delay, notwithstanding the suddenness of the call in mid-summer, when some of the medical officers as well as others were enjoying their vacations; a telegram reached each one, near and far, and within twenty-four hours the home patients were transferred to the professional brother, and each medical man was at his post. After the encampment was properly formed, measures were at once taken by the Medical Department to disinfect the City of Homestead. The pollution of that city was something unheard of in the annals of hygiene, and, it is to be doubted if any Board of Health in Christendom could have so quickly, and so effectually, disinfected an entire city as was done under the direction of the Medical Department of the National Guard, at that time. Notwithstanding the heated term, and the severe duties, the health of the camp was excellent; the only severe cases being caused by the impure condition of the town just referred to. Some of these proved fatal.

I trust I may be permitted to summarize what the Medical Department of the National Guard of Pennsylvania have accomplished.

First. They have given the army the best bill of health of any military organization in the world.

Secondly. They have suggested certain improvements in the medicine chest, some of which have been adopted by the United States Army.

Thirdly. They have planned a portable emergency stove for cooking, an account of which by Lt. Halberstadt, Assistant Surgeon, 4th Regiment, was published in the proceedings of this Association for the year 1893.

Fourthly. They have suggested plans for portable sinks to add to cleanliness and comfort.

There are, however, certain subjects to which I may be permitted to allude, which place the Medical Department of the National Guard of Pennsylvania at a disadvantage. There is needed a thorough revision of the Medical Department and its permanent organization upon the basis of that of the United States Army. As it now is, "Promotion cometh neither from the East or from the West." I speak, not for myself, but those who are to come after me. Nearly twenty-five years of continuous duty is sufficient and all that I am now looking for is to be "retired on full pay." The special enlistment of the members of the Hospital Corps for that purpose, and for no other, as also the enlistment of men as cooks, for that purpose and no other, are matters to which the attention of the military authorities of Pennsylvania have now been called, and no doubt, such amendments to the military code providing therefor, will be enacted during the next session of the Legislature.

In conclusion, it may be stated, that as at present organized, the Medical Department of the National Guard of Pennsylvania, is ready for any emergency in the camp or in the field, and, if there come a day when this Federal City should be distressed by foreign enemy, or threatened by anarchy, that Guard to which I belong, could after twenty-four hours' summons be gathered at this point ready for active campaign, against the foes of good government—every medical officer present and ready for duty.

THE HYGIENIC CONDITION OF ENLISTED MEN AS AFFECTED BY MORAL AND INTELLECTUAL INFLUENCES.

BY HOWARD E. AMES,
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Every officer in our navy who has been stationed at some isolated port, or on cruising ship, has heard the complaints of his fellows at the dullness, or ennui, that is caused after a prolonged stay on the same ship or station; particularly after the newness has worn off. The common reply to the question, "How do you like the duty?" "Oh! well enough, but the place is so devilish dull, when one is off duty. It is beastly on that account, for there is nothing to do, but drink rum, play poker, talk shop, listen to stale jokes, or read; but one can't do these all the time, and we have no other diversion." What a hearty welcome a new comer receives; with what interest his every story or experience is listened to; how carefully he is studied. He is fresh, and for a time, he is a Godsend, an ephemeral hero; ere long, he is apt to become dull. He, also, is first interested in his messmates, and his surroundings; but he lapses, grows dull like the rest, and simply exists, and looks forward to a change of ship or port. Has this question ever seriously impressed you, that if the officer whose intellectual scale is higher than that of the enlisted man, feels this mental depression, how must the sailors feel? Their intellectual horizon is narrowed; their comforts less; their standard lower; their working sphere smaller; their liberties and privileges more limited. They may drink rum, play poker, and read as well as the officers. The two former can only be indulged in when on liberty, which is rather a spur to excesses, as it comes "few and far between." A new shipmate is like to them as a new messmate is to the officers; the result in the main is the same. They are to be pitied more, for they can't get away from each other; they have no room or quiet corner to withdraw from the "maddening crowd."

For obvious reasons, seclusion is not allowed, but is strictly prohibited, and carefully prevented; they have no responsibilities to steady them, they are mere automatons.

I hear some say, "Well, what of it? When men go to sea they must expect just such things; they must make the best of it, it is the normal feature of navy life. It is tiresome, but Jack don't mind it, he is used to it; when he gets tired he will growl, swear, and fight on the sly, or get glum. Twenty-four or forty-eight hours of liberty enables him to blow off steam; he 'whoops things up, four bells, and lets her go.' He comes back a little rocky, soiled, and bruised. A little rest, and he is all right again for three months more. Of course, he gets drunk, for he 'aint no saint.' Of course he will swear and fight, he 'aint no angel.' Of course, he will run with loose women, he 'aint no Joseph!" It's part of their nature to do such things, and he looks forward to these sprees with great expectancy. They enjoy themselves in their own way, and why disturb them? Let well enough alone."

This seems to be the accepted condition of Jack; in fact, it is a fair synopsis of his pleasures. It has the merit of long usage, and we are lulled into a sense of apathy from long contact with such experiences that are almost universally met with in our service. Let us pause and ask the question: Is this a normal condition? Let us look into the causes and see if there is no remedy for this condition of affairs.

Health is perfect functioning of the various parts of the body in regular sequence. Any variation from this rhythmic action in any part without compensation in the others is bound to produce an injurious result. No matter in what system the discord is introduced, some other system is affected; the resultant disturbs the harmony of the whole to a greater or less degree. Nothing is more delicately balanced, or more easily disturbed, than the nervous system; and it is to this we must turn for a moment, to its psychology, or, a branch of it, the mind. There we find the key (and the answer) to our subject. Disposition is the prevailing spirit of the brain; it may be strong in tendencies for good or evil; the inclinations, being weak and variable, are more easily molded and strengthened.

The education of these natural attributes forms and reflects the character of the individual. That the mental state can be improved or degraded is acknowledged by all; and environment is the factor in this development. If the surroundings are sanitary, in air, food, light, dress, and above all a moral and intellectual atmosphere, the mental development is in the ascendancy, which is also equally shown in the physical growth. It is difficult to separate the various factors that make up the whole as all are required; so must merely touch, and not dwell, upon but one. We have them all in greater or less degree in the navy, not so high as we hope, or even so high as present conditions demand; but our expectations are strong, and our desires we think reasonable.

Nineteen years' experience has enabled me to note the great improvements that have been taking place in every department of the navy. We are still deficient; deficient in many things, but, on the whole, we are to-day many degrees superior to what we were when I first entered the service. Contentment in its fullest sense is a Utopian dream in the navy, and its realization is neither asked nor expected. But amelioration and improvement in the sailor's life are obtainable, and are demanded on strictly sanitary grounds, which will make his life not only more profitable to the Government, but more enjoyable and healthier for the individual. The pictures drawn by many writers of the condition of our ships in the past are familiar to many of you. They are true to life, though startling to the novice. What we aim at is further advancement in Jack's life and surroundings. I will briefly outline his daily life, and point out the defects and remedies.

Our ships are kept clean and in beautiful condition; this is a work that falls daily upon the men and they do it well; it is the first regular work done on the ship. Next, the quarters inspections and drills, which are kept up through various parts of the day; his meals and idle moments fill up the rest of the waking hours. Now all this work is absolutely required to keep the ship in condition, and the crew efficient; there is no fault to be found on that score. The men are supplied with a ration that is superior to that of any navy in the world. The quantity is ample, the variety great. Their

clothing, in the main, is excellent, they are well housed, and their bodily wants are carefully looked after. Let us turn to his mental requirements and conditions, and it is on these I will dwell.

I shall treat the subject with a frank freedom and shall not be either minute nor definite, but shall aim at general wants, indicate lines to work on, and endeavor to illustrate by comparison the good observed on ships where isolated attempts have been made to improve the morals and intelligence, and promote contentment, with those of the old policy of letting Jack alone to follow his own inclinations. Before doing this it is well that the man-of-wars man should be briefly placed before you, that you may get a hurried glance of him, that you may see him not only in his worst, but in his best light. I venture to say there is no class of men less understood than the American Man-of-wars men, and toward whom less forbearance or charity is shown by the landsman. This is readily accounted for as he is seldom seen at his best, except by those who follow the sea. The common remark "a drunken brawling sailor," is alas, an epithetical title that is unwittingly earned by poor Jack, and though unmerited, is awarded him from the fact that he is so often seen in that condition, and his identity and calling is so easily distinguished by anyone, that it makes a deep impression. His bronzed and prematurely wrinkled face, his peculiar rolling walk, his fearless but friendly look,—so often mistaken for impudence,—his confiding nature, and generous hand, all mark him a prey for the suave approaches of the depraved, and he falls an easy victim to the wharf pimp and land shark. His footsteps, from the moment he leaves the boundaries of ship, or navy yard, are trailed by the beat, the rum-seller, the brothel-keeper, and thief; even the minions of the law bristle into activity, and dog his footsteps, ready to pounce upon him; for he is at once classed as a dangerous individual. Seldom is it that he succeeds in passing the narrow girdle that bounds the water front of our sea ports; and if he do succeed, and appear in the more fashionable parts of the town, he is regarded with suspicion and is as a rule shunned by men, women and children. They know him from knowledge gained from some newspaper article, in which he

is recorded in double-ledged type, as a violator of the peace, or breaker of the law, and they expect to see him suddenly break into some outrageous action. He may be cold sober (it is rarely one sees him in a respectable neighborhood unless he is sober), still he is shunned. Should he be arrested and dragged into court, on charges he is innocent of, he receives little consideration. He stands ashamed and penitent; in vain he tries to recall some incident of his spree, but his drugged and besotted brain can recall nothing; his memory is a blank; none but unsympathetic faces and unfriendly eyes meet his. Stripped of his clothes, robbed of his money, he begs pardon of the judge and promises to rid the city of his presence, if he be allowed to go. Bruised, besotted, bedraggled, with the dirt of the street, poor wretched Jack drags his trembling body back to his ship; back to the guardo for re-enlistment; back to his friends, his ship-mates, his home. He has no other place to go to. What is his treatment there, is he turned away? No, never. Some officer or ship mate knows him, and helps him up. They see no saint, no devil, only an unfortunate victim of the vicious. They remember him and see in him his worth; midst danger and storm, on deck or engine room, unflinching, untiring, uncomplaining, alert to the dangers about him, obedient to his officers, proud of his country, his flag and his ship. His purse always open to charity, the biggest coin sought for, and no questions asked, is the rule. His heart is big, tender and sympathetic; his horny hand's as gentle as a woman's when sickness or distress befalls a shipmate. When death overtakes him in a foreign country, his grave is marked by a lasting monument erected by his shipmates.

Lieut. Craven, in his Journal, says: "Oh, what a dog's life is that of the sea! How often have I looked at Jack Tar with mingled feelings of wonder and pity—wonder that a natural man should make an amphibious animal of himself and expose himself to dangers that shorten his life one-third. By a computation of mine, I judge that the tar does not, on an average, spend one-twelfth of his time on shore; the rest of his time is spent in close imprisonment within the wooden walls of his ship." This is a silhouette picture of Jack, incomplete and unsatisfactory; incomplete in his good qualities,

neglectful of his faults. True, though roughly drawn. The questions are, how can we improve his conditions? What are the remedies, and how can we apply them? Or the question is, Is the subject worthy of consideration? Dr. Benjamin Rush says: "Crime follows degraded morals." Daniel Webster said: "The right of the State to punish crime involves the State's duty to teach morals." Dr. Edmund A. Parks, says: "Hygiene is the art of preserving health; it signifies perfect culture of mind and body, and aims at rendering growth more perfect, life more vigorous, and death more remote."

Defective morals and discontented minds exist in the service, and these have an injurious effect on the physical condition of the men. They can be improved, and it is our duty to do it. The three men whom I have quoted, sustain me in what I here set forth. Rush shows the dangers of degraded morals; Webster shows that it is a duty to correct them; Parks, that they are inimical to health. The degree of degradation should not enter into the discussion; great or small, if capable of correction, it is the duty of the Government to attempt it. I served on a ship (she was painted black), in which the regulations were carried out to the letter, and rules not in the regulations were also carried out. I do not hesitate to say she was perfect in one way "ataut" from truck to keel. She would have impressed anyone not attached to her as a model; her yacht-like appearance, so beautiful in every way, and so comfortably fitted for officers and crews; yet she was an unhappy ship. She was ruled with a rod of steel; the men received no consideration; the officers about the same. Now what was the trouble? It was all work and no play.

There were ample hours to afford rest and amusement for Jack, but none was ever indulged in; in fact, they were discouraged. There was no joyous laughter ever heard within her somber hull; there was no innocent skylarking about her decks; no music, either vocal or instrumental ever broke the stillness of the evening air, either in port or at sea. Liberty was given as seldom as regulations allowed, and it was dearly paid for. The returning liberty-party was scrutinized with a tyrannical minuteness, and any shortcoming punished

with a promptness and vigor that only the most daring and reckless would face. No pets were seen about the ship belonging to the men; a single cat softly trod about, and he appeared symbolic of her general condition. The daily inspections were superb, so far as bright, clean arms, tidy uniforms, perfect decorum, and silence were concerned. Look in the faces of the crew! They were clean, they were intelligent, and a fair type of sailor men, but there was not a single face that bore a soft expression. The compressed lips, the contracted brow, the depressed corners of mouth and eye, the expanded chest and rigid position of body. The quick, momentary glances that caught your own, all indicated discontent, hatred, unwillingness, depressed spirits, disappointed hopes, suppressed emotions, a fettered manhood. Extra liberty was occasionally given to a few in some quiet and out-of-the-way place to fish or walk ashore. But it was seldom requested; too many refusals had been given to encourage further attempts. I have often noticed her beautiful boats, so clean, so graceful, so perfect, hanging in idleness at the davits. They were seldom in the water except for drill. No racing among the crew, no sailing or fishing parties disturbed them. Very seldom visiting parties went from that ship to other ships of our navy, or from other ships to ours; no library existed for the men, a few books belonging to individuals circulated among the crew. No religious service was ever held on board. Were the officers happy? No; they were a discontented lot, or so it seemed to me, compared with the happy ship that I had left.

Why was this trouble? you will ask. It was simply a damnable application of a good set of regulations by the usurping of autocratic power of a narrow-minded man, who should have prevented instead of causing such a state; he was unintentionally assisted by the discontented minds of the other officers who, not receiving consideration from their senior, allowed their injured feelings and unhappy state to pass to the grades below, and so it ran through the ship. A little thought on the part of the Captain, a little consideration for his officers, and by them for the men, a knowledge that the Admiral and Jack have equal claims on the Almighty; that they are built the same, have the same organs, feelings, appetites; in fact, the same mental attributes, varying only in degree and intensity. In

other words, if intelligence had been used and properly applied, the ship could have been made a pleasant one. I firmly believe that the vast majority of what are called unhappy ships are due to the officers, and not men. We lose sight of the fact, that we have ring leaders among the officers, as well as the men, for either good or evil; and next to the Captain, no one can influence the condition of the men more than the executive officer. I do not mean that to accomplish this an extra burden will have to be placed upon him: it will require little work; I simply mean he can advance or retard happiness and contentment with very little exertion; a few thoughtless orders can depress, a few thoughtful ones can elevate the crew; a square personal talk with the Captain, when the Executive is indifferent, can often bring about the same result.

I served on another ship (she was painted white), very similar in build, with the black one. The same regulations controlled her commanding officer, about the same crew and with the same natural conditions, the same drills and requirements were exacted from the men. The same obedience, promptness, and tidiness marked the crew. The only difference that a visitor would have noticed in them would have been in their faces, not in type or character, but the contrast between disappointment and despair, in the faces of the first, with the contentment and confidence in the faces of the last. This great contrast would have raised the inquiry at once, what is the cause of this marked difference? Let me answer, it was this: The white hull of the last vessel was full of life and energy during recreative hours. The cheerful voices of the men were heard in song vibrating in the evening air either in solo or chorus; natural, hearty peals of laughter would ring out as some joke was perpetrated, or story told; the shuffle of feet were heard keeping time to the music of the volunteer band, as they whirled to the waltz, or other round dance, or tried a jig or break-down; even the ship's dog would give a joyous bark as he received the caresses of the men after performing some simple trick he had been taught, the pet minor bird would add to the pleasure by giving his song; feats of strength or skill in boxing, were indulged in; races in boats, either under sails, or oars, were permitted on the asking; books were numer-

ous and well thumbed; liberty was no novelty; visiting parties to other ships were frequent; dinner parties were given on occasions of some holiday by the ship's company to the ships of our own or other nations; desertions and intemperance were rare; punishments seldom; the brig was unlocked and empty most of the time. She was a happy ship! The men were not saints, they were not exactly sinners. They were simply a fine crew of sailor men. They drank in moderation; their other faults or vices were bearable; vile habits were suppressed; it was attempted once but detected and promptly put down by the crew, the offender was made so uncomfortable by the crew that he sought forgiveness, which was granted. No other case ever appeared.

The moral and intellectual tone of the ship was striking, and during the three years I served on her this condition was kept. This happy state was brought about solely through the thoughtful application of a set of rules by the Captain and first Lieutenant, who were seconded in their work by the other officers, and without relaxing for one moment the rigid laws of the navy. Every violation of the regulations was severely punished, but never with violence or show; it was with regret, a few words of advice, an injunction to mend his ways, an appeal to his sense of manhood, and the delinquent was awarded his punishment which was carried out to the letter. He was not branded; the road to regaining the confidence of his officers and the liberties he once enjoyed was open to him, and was graciously accepted. I have seen a man's face brighten as he heard his name read promoting him from the lowest to the next grade, his head would be held higher and his steps lighter as the Captain would encourage his attempts to rise, by the simple words "I am glad to see your improvement, my man; I hope to hear your name called in the next class on next mustering day." Interest shown by the officers in the men is always appreciated by the crew. A few friendly words to individuals, by the first Lieutenant or officers of the divisions commanding them, such as, "Your boat looks well," "You did splendidly at drills to-day;" or a quiet word of warning, such as, "You did not do your best, Jack; I know you can do better, so try; I expect it, I expect to commend instead of

clude you next time." These are such trivial things that they are apt to pass unnoticed; small though they be, they bear fruit.

I have seen an old salt made happy by the recognition of an Admiral, accompanied by a shake of the hand, with the words, "How are you T. ? glad to see you." "Fine sir, fine, and you are looking well, Admiral, I am glad to see." How his old heart would grow warm over old memories! How that old salt would hitch his trousers and tell the youngsters, "What me and the Admiral done in the sixties. The mere fact that he occupied a small spot in his Admiral's memory was a pleasure to him. I have seen a whole boat's crew, who had made a gallant pull in a race, but failed to win, not from lack of skill, but poor boat, chagrined by the thoughtless reproach of an officer, who called them a lot of duffers. I have also seen a mortified losing crew made happy by the cheering remarks: "Boys, you did well: it was the boat, not the men, that defeated you." But you did well, it was the boat, not the men that defeated you." But why keep your time with such trivial things. I only plead that they are raised as signposts to the path that leads to the highway on which the causes of trouble travel. What is the remedy, or remedies, and how can we apply them? Time will not admit of details, but general principles I will endeavor to give:

First.—The recognition by the Navy Department that the condition exists and that something should be done; and by rendering assistance and encouragement.

Second.—The co-operation of the commanding and all other officers, particularly the chaplains, who could do this aside from their strictly priestly functions.

Third.—The help of the men themselves.

If Daniel Webster be right, then it is the duty of the Government to improve the condition of the men. The number of court martials shows that due consideration has not been given the subject of how to prevent them by other means than making an example of the offenders. Summary court martials are too much like locking the door after the goods are stolen. If they can be reduced by other less violent means, they should be tried. Instructions could be issued to commanding officers urging them to give more thought

to the subject, and a small amount of money allowed for the purchase of books, games, apparatus for gymnastics, and music. A ship's bugler could also combine the ability to play on some other musical instrument, such as violin or guitar.

The commanding officer should be directed to give liberty as often as possible, and to have a boat sent at such times as to enable the liberty men the option of coming off to their meals and returning them to shore immediately after meals, with a late boat at night after the places of amusement are over, to enable them to sleep on board: thus saving them not only the price of meals, but also the cost of lodgings. This would be an incentive for many to avoid the dangers that beset them in the small hours of the night, which would not only improve them but prevent many brawls that occur at the time when honest men sleep. And let it be clearly understood that his return on board will not reduce his term of liberty in the least. Encourage all athletic sports, also singing, dancing, boat racing; and all innocent amusement, and allow certain ship's pets. In all these things the officers could be of great value in advising and assisting. I would also provide that continuous service men be given the privilege of shelter and food on any receiving ship, or naval station, while on three months' furlough. His bag, hammock and ditty box to be taken care of for him at any of these places, even though he does not desire to eat and sleep there. That his money be kept for him by the paymaster at any ship, rendezvous or pay office, and such sums be supplied him as he may desire. This would check to a great extent the thieves and land sharks that now work him as their prey when the earnings of three years are carried in his monk-bag or pocket; also, allow him the privilege of free medical advice and treatment at any of our hospitals or dispensaries. Encourage them by impressing them with not only self-respect, but urge them to persuade others to do the same; form a minor board of censors of the petty officers, urge upon them the advantages of the suppression of all vicious habits, and give them the power of investigating the petty bickerings among the crew, and let them present the cases against the malefactors; let them appear at stated times with suggestions that they think would benefit the general welfare of the crew in

promoting good will and harmony. The little privilege they would appreciate and it would not be abused; they would feel that an interest was taken in them for their comfort and happiness and a higher tone would be the result. The treatment of liberty men at our Navy Yards should be changed. How is it managed now? A sailor returns at night from liberty, arrives at the main gates, and is not allowed to enter, but must stand outside in all weather, until the guard is ready to admit him and escort him to his ship. An officer may appear at the gate and pass him in and down the yard with him, otherwise he stands outside in snow or rain, wind or calm, until the time comes for admission. In storm, Jack naturally seeks shelter in some handy saloon; he pays for the shelter by taking a drink; he may not want it, but he takes it to mollify the saloon-keeper. This one drink may cause him great trouble. A waiting room should be provided just inside the gate; let it be heated and lighted, with benches to sit upon; allow him to talk and smoke while waiting. Let anyone stand out for half an hour in storm and he will appreciate the condition and realize how grateful such a shelter would be. No doubt these exposures are the starting of a cold that ultimately ruins the man physically, or causes his death.

To my brother officers who wear the cloth, I turn with reverential feelings. Should my remarks grate or jar your religious thoughts, I sincerely ask your charity; read not only my lines, but between them. I think you can find food for contemplation. I shall not ask you to loose sight of your religious duties, for they are too precious and important. I shall indeed be pleased if I succeed in breaking the assumed beatific look that some of you wear, and which sometimes seems to me to be cast in brass. For a change, I implore you to try a grin or frown, it matters little, only study it. Stand in front of your mirror, when you do. You will be surprised to learn that your face is fleshy, of the earth, earthy, and that it is plastic; it will not crack if you laugh; its fairness will not be injured by facing the glare, heat and fumes that come from the caldrons of vice. Unfold your hands from the bible once in a while and place the precious book in your pocket; let your gaze fall occasionally upon poor Jack instead of fixing your eyes eternally heaven-

ward. Do not turn on too strong a light upon his sins, but wear slightly smoked glasses when you scrutinize his weaknesses. A clergyman's sore throat accompanied by deafness is a good thing for you to have occasionally. I know there are some who feel that every moment of their lives is to be devoted to the teachings of religion, but they play their scriptural symphonies upon one string, whose monotonous twang lulls them into an oblivious doze, the echoes of which are then accompanied by an inspiratory sob and an expiratory whistle, so soft and low as not to drown the thoughts of either saint or sinner. Add more strings to your harp and vary your songs, and I think they will reach more ears. Do not placard your meetings; come inside or stay out; no loafing around the door; smuggle in a sinner occasionally, or lure one who is loafing about the outskirts; you may trip him into a fountain of purity that will wash him free from sin and enable him to stand among the chosen ones. In some of the play houses in Japan, a curtain is raised quickly at some interesting point in the performance, which gives the passers outside a momentary glance of the inside; it whets their curiosity and the momentary stimulation wins many into paying the admission. I think this suggestion could be applied by some of you. Broaden your views in Jack's behalf. Admit that a partial control of a bad habit is an advance in the right direction; try work on this line. There is a moral in the story of the old negro preacher and one of his flock at an experience meeting: "What has religion done for you, brother Ham?"

"It's de making of me, deah pastah; why las' week I went into a sto' ter buy a pair of boots; no one was dere; I look all around and sneak a fine pair of nine dollar boots under my cote and was gwine ter walk out, but 'ligion tell me it war not right, so I drop 'em and walk off with a common pair of two dollar shoes."

"Glory for that, Ham! Ef you stick to dat principle, brudder, in the same propo'tion, you is shore to get to heaven: dat is, if de Lawd spare you a few years."

I will pass for a moment to the Medical Corps. I will not dwell, for we know each other. Can we do more than we have done? Yes, I think we can. We, above all others, know of Jack's frailties;

he unburdens his shortcomings to us with frankness, if properly approached, and appreciates our work. He is anxious to help, and I have found that by gaining his confidence, we can materially advance his recovery when sick, and maintain it when well. There are some who never try to win his confidence. They wrap their professional mantle tight about themselves, and draw their cap of knowledge so close over their eyes that they fail to understand Jack, or be understood by him. They never advise, they stand by to cure. They can not draw the lines between sanitary advice and a moral lecture. They fear if they call Jack's attention to the physical and mental dangers of excess in rum drinking and excess in venery, that they will be dubbed a religious teacher instead of medical adviser. I am convinced that such sophistry deters many. Let us teach that cleanliness leads to Godliness. Let the Chaplain teach that Godliness leads to cleanliness. We can show that disease causes mental evils. Let the man of cloth show that moral evils cause disease. If the tar will indulge his appetites, advise him how to do it with the least danger. If he be unfortunate, do not reproach or abuse, but cure. Tell him of the prevalence of venereal disease and its dangers; tell him to be careful. Avoid the phrase "Don't go"; dwell upon the advice: "Come to me at once after exposure." We can do much by simple talks on hygiene, personal and general. Let them know how a tooth brush, properly used, may prevent dyspepsia; that clean bodies will keep off disease; that a gonorrhoeal discharge may destroy sight: that the pipe of the syphilitic may poison the well. A few simple chats with the crew on such subjects will do great good. Let us draw a little nearer to Jack and get a better view of him, and try a little cultivation in this new field.

Some years ago a minister full of goodness and righteousness, backed by a generous education, entered the service; he was young and ambitious. His sensitive nature was rudely jarred as he heard himself called, jocularly, "Holy Joe" and the "Sky-pilot." The answers he received to his request for suggestions from the officers as to what would be the best methods to do good among the men was as startling to him as the question was to the officers: they were merely looks, they were mute; he was dumbfounded at the

silence. The whole thing was too sudden, too unlooked for, too startling. Their feelings in one respect were mutual. They were like those of one of our great generals and presidents and a celebrated author and wit, who, after being suddenly and unexpectedly introduced, stood looking at each other for some moments. The wit gave vent to his thoughts: "Mr. President,—General,—I don't know how you feel—I feel embarrassed." "So do I," was the laconic reply. Our chaplain went among the men and was severely shocked by the vulgarity and profane talk among them. He gave thought to the matter, and in his analysis, he reached the conclusion that most of its degradation was due, not so much to Jack's inclinations, as it was to his environment; the absence of the normal conditions of life on board ship, the lack of home influence, and the lack of decent and interesting topics of conversation. In his library he had a volume of Huxley's lay sermons. He picked out the story of a piece of chalk, mastered the details, supplemented this from other sources, and then going forward in the evening, invited the men to an off-hand talk. With a bit of chalk in one hand and a low-power microscope in the other, he not only secured their attention to an intense degree, but succeeded in satisfying a real mental hunger. That talk continued the topic of conversation for days after, displacing the vulgarity that had previously shocked him. He told me that no sermon that he had ever preached on Sunday so perceptibly elevated the tone of conversation as that evening's lecture. This same idea was continued with even better results; he said: "For through it, I led many repentant souls to Christ." This chaplain, after twenty years' experience, has brought his ideas into practical application to the whole service. It is now in use at the Naval Training Station at Newport, R. I. Allow me, at the expense of wearying you, to briefly sketch them.

Beginning with an oil stereopticon on the "Hartford," in 1876, he has stepped to lime light and recently to the electric light, which may be considered nearly perfect, in illustrating a series of subjects for the instruction of apprentices at that station, which the commanding officer regards as of practical value and usefulness. These lectures are given three times a week, and are beautifully illustrated,

and I will say are received with the greatest enthusiasm and attention by the boys. Another splendid fad of this chaplain's is, what he jestingly calls his paste-pot campaign. This was started on the receiving ship "Wabash" in 1888. It came about in this wise: Observing the listlessness of sailor men about the decks, with nothing to talk about, suggested at first the culling of naval news from the New York papers. On certain evenings he read these clippings to the men. This did not succeed. It then occurred to him that these things might be published. The executive officer furnished him a square board. He procured some sheets of manila paper, pasted his clippings upon it, carried it forward, and tacked it up. To his satisfaction he saw the crew surround it and demonstrate great interest. A little quiet observation showed that there was scarcely a minute of the day that it was not being read by someone. It started discussion and kept up the esprit de corps. The experience was a happy and successful one in every respect. Discrimination was shown in selecting articles; nothing reflecting on officers or men was permitted; expert, or good articles, were posted. The current history of the navy was given and illustrated by cuts from the leading picture papers. Subsequently he placed in a groove behind the bulletin board an academic dictionary and a large atlas geography. The worn condition of these two books of reference proved the value of this experiment. I could mention other similar methods in other lines and their success, but must pass them unnoticed. Now the bulletin and lecture system can be extended into service generally. Bright pictures are wonderful and valuable vehicles of instruction, and by their aid a crew of illiterate men can be made intelligent, happier, more moral, and consequently, healthier. They can be taught physical geography, simple astronomy, physiology, naval history, the principal facts of political history. The lantern can be used for entertaining and for teaching anything. There is no limit to the subjects. The Chaplain informs me that 10,000 slides are now available on subjects, and places, and for the first time in the history of the Navy stereopticon pictures have been made practicable in illustrating lectures on board our sea-going ships, from the fact that our new ships use electricity, and the invention of an arc lamp that

can be used by an incandescent circuit. Two of these lamps are now in use at the Training Station. The bulletin has been continued for three years, these two features having received the commendation of every officer who has seen them in use; they have raised the moral and intellectual tone of the boys most markedly. It is believed by many that these two features, the bulletin and lantern, if introduced by the Navy Department would be of the utmost value. The cost of both would be small. An electric light stereopticon, with fifteen lectures and six hundred slides would not exceed \$500.00 placed on board ship. This is a permanent investment; the nightly cost of the light is one mill.

The last question, how can this be done? I will now answer. By establishing an office at the New York Navy Yard (that being the chief feeder of the service), for the welfare of the enlisted men. A Chaplain should be placed in charge; it is just the work that he should be engaged in. 1st. his duties would be, the preparing and printing of these lectures adapted to the average intelligence of the men in the line already indicated. Also to selecting and making slides for the same and personally inaugurating the lecture system on ships fitting for service; he will keep track by correspondence of these lectures and slides, arranging for exchange between ships abroad. 2nd. He shall prepare and distribute the weekly or semi-weekly bulletins to all ships in commission. 3rd. For interesting the sympathy of well-disposed officers in the services, and by degrees unifying and directing the same by forming a nucleus to which shall converge the best that concerns the moral, intellectual, and recreative interest of enlisted men and marines in the navy. The Chaplain assigned to this duty to receive sea pay. The subject is one worthy of trial. I firmly believe that nothing would tend to improve the efficiency, the patriotism, the health, and happiness of our seamen and marines more than the adoption of this scheme.

OUTLINES OF THE SANITARY ORGANIZATION OF SOME OF THE GREAT ARMIES OF THE WORLD.

BY MAJOR JOHN VAN RENSSELAER HOFF,
Surgeon, U. S. Army.

- I. The Army of France.
 - II. The Army of Germany.
 - III. The Army of Austro-Hungary.
 - IV. The Army of Great Britain.
 - V. The Army of the United States.
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I.

THE SANITARY ORGANIZATION OF THE FRENCH ARMY.

A study of the military history of the French,—a people who loved war, and who, in the words of their great Minister, Sully, "had pursued no other trade than that of arms,"—affords the most satisfactory results in determining the evolution of Military Sanitation.

From the days of Pare, "The Father of Modern Surgery," whose services were so universally recognized, and whose opinion was so highly valued by the army that it was sought even upon purely military questions, Military Sanitation has advanced by halting steps, indeed, until to-day it has become the most specialized of the many specialties in our profession.

In 1591, at the siege of Rouen, field-hospitals to follow the movements of armies first appeared in France. The Hotel des Invalides, for worn-out and disabled soldiers, was founded in 1659. In 1630 Medical Officers were first given a distinctive military title. In 1708 a royal edict created a permanent service of medical and

*Note—Information upon the subject of this paper has been sought from convenient sources, and the compiler has equally freely used the substance and the words of the various original reports, etc., from which he has gleaned. He is particularly indebted to the Military Information Division of the Adjutant General's office, U. S. Army, for valuable assistance.

surgical inspectors general and majors to accompany the army. This corps numbered two hundred officers, and its organization has continued from that day. In 1718 medical schools for army and navy medical officers were founded. In 1747 Fontanieux promulgated a code of regulations for the government of military hospitals—the foundation of sanitary regulations obtaining to-day. He reorganized hospitals for the training of medical officers, and instituted sanitary councils. In 1761, de Chamousset inaugurated competitive examinations for appointment as Medical Officer, and established a Central Pharmacy. In 1780 "The Journal of Military Medicine and Surgery" was founded.

With continued peace, the French Military Sanitary service retrograded, and in 1788 the medical corps numbered scarcely 170 officers. This is the common history of every military organization. No truer words were ever written than those of the rhyming soldier of Delhi:—

"When war is rife and danger nigh,
" 'God and the Soldier!' is the People's cry;
"When peace is made and all things righted,
"God's forgot, and the Soldier slighted."

And particularly are they true of the Medical Department. In all grades of society we find a disposition to ignore the value of the medical profession, until sickness or accident brings them into close and necessary contact with its members; they are then compelled to appreciate their value. If this be true in civil life, how much more so is it in the army, in times of peace, when no heed is ever given to the warning from military sanitarians to "prepare for war."

But to return to France. The revolution broke out, and was followed by the Consulate and the Empire, a period of unceasing demands upon the sanitary service—the period of Percy, Larrey and Desgenettes. Thanks to their activity, knowledge, and genius, the work was crowned with a success heretofore unknown. Percy and Larrey disputed the honor of having perfected the field hospital and ambulance wagon. Larrey, pressed by the necessities of the situation, devised the "Cacolet," by means of which the sick were

carried on the backs of mules or camels. At Jaffa, pestilence decimated the army; Desgenettes conquered it.

In the marvelous campaigns of Napoleon, in which he moved huge masses of men from one end of Europe to the other, his efforts were greatly assisted by those geniuses in military sanitary organization, Percy and Larrey. What they accomplished at that time in creating and training a sanitary corps, from disunited and heterogeneous elements, a corps the like of which had never existed in any army before, and of which, indeed, Napoleon himself had never thought, seems to-day to be the crowning glory of that heroic age. But the full fruition was not yet, indeed, is not yet. The strange notion that the brain capable of originating such an organization could not command it, obtained then, and obtains to-day. It is the irrepressible conflict in every service. The Medical Officer recommends, the General commands, an officer of direction, intendment, what not, executes.

October 19th, 1841, an ordinance was enacted giving medical officers rank in the army, but without authority; even in their own corps, they remained under the control of the Bureau of Direction, through which alone they could communicate with the military authorities.

By a decree dated May 3rd, 1848, the Medical Corps obtained autonomy, and assimilation in organization to the other staff corps of the French Army; but in 1852 this decree was declared revolutionary. Vainly had the medical officer demanded reform, and then came the sad lesson of the Crimea. Always the same story; it is written in the history of every nation—ours in deeper red than others,—and the pity of it is that the lesson must be learned over and over again.

The decree of June 18th, 1860, gave the medical officer rank assimilating to that of other officers. The lessons of the Crimea, of the Italian War, of the overwhelming disaster of 1870; the devotion of medical officers in Africa and in Mexico,—all were necessary to destroy prejudice against and prove the value of autonomy for the Medical Department. To-day, in spite of all opposition, the cause, in France at least, has been gained.

Let us still further consider the lesson taught us by this nation, by a glance at its perfected sanitary organization, the merest outline of which it is believed will convince the most incredulous that military sanitation is, as has been heretofore stated, the most specialized of all the specialties of our profession.

PEACE SANITARY ORGANIZATION OF THE FRENCH ARMY.*

The Medical Corps of the French Army (*Corps de Santa Militaire*) consists of the medical officers and apothecary officers. They are graded as follows: Medical Director-General; Medical Inspectors; Principal Medical Officer of the First and Second Class; Surgeons-Major of the First and Second Class; Assistant Surgeons-Principal Apothecaries, First and Second Class; Apothecaries-Major of the First and Second Class; Inspecting Apothecary, Major, First and Second Class; Assistant Apothecaries-Major, First and Second Class. These grades, both in the cases of the medical and apothecary officers, correspond to the grades of the military hierarchy, and the persons holding them have the standing of officers. The correspondence of the grades of the military and medico-military hierarchies runs from Medical Director-General, who ranks with a General of Division, down to the Assistant Surgeon-Major or Assistant Apothecary-Major with the rank of Second Lieutenant.

The total strength of the corps, according to the Budget of 1892, is 1400, distributed as follows:—

Medical Director-General.....	1
Medical Inspectors.....	9
Principal Medical Officers, First Class.....	40
“ “ “ Second Class.....	45
Surgeons-Major, First Class.....	296
“ “ Second Class.....	456
Assistant Surgeons-Major, First Class.....	393
“ “ “ Second Class.....	17
Total	1257

*For these details of organization the compiler is indebted to the Military Information Division of the Adjutant General's office, U. S. Army.

Inspecting Apothecary.....	1
Principal Apothecaries, First Class.....	4
" Second Class.....	5
Apothecaries-Major, First Class.....	43
" Second Class.....	58
Assistant Apothecaries-Major, First Class.....	38
" " Second Class....	4
Total	143
Grand total.....	1400

The personnel of the Corps de Sante is distributed as follows:—	
Medical and Apothecary Officers in the "directions" and hospitals	454*
Medical and Apothecary Officers, detached on various services	60
Medical Officers of all grades assigned to regiments, battalions, etc.	876
Medical and Apothecary Officers in the Gendarmerie and the Garde Republicaine.....	6
Medical Officers with Fire Brigade.....	4
Total	1400

A regiment of infantry, three battalions of four companies each, has generally one Surgeon-Major, First Class, one Surgeon-Major, Second Class, and one Assistant Surgeon-Major, First Class. The eighteen regional regiments of infantry have, however, no Surgeon-Major of the First Class.

Each separate battalion of infantry has one Surgeon-Major of the Second Class, and one Assistant Surgeon-Major, First Class. Cavalry regiments have no Surgeon-Major, First Class.

Regiments of artillery and pontonniers have the same number of medical officers as infantry regiments, but separate battalions of artillery have no Surgeon-Major, First Class.

*The Military Government of Paris and the Army Corps have each a Medical Inspector or Principal Medical Officer, First Class, as Director of the Sanitary Service. The Three Divisions of the 19th Corps in Algiers have each a Medical Director; also the Brigade of Occupation in Tunis.

Engineer regiments have each one Surgeon-Major and one Assistant Surgeon-Major, both of the First Class.

Each squadron of the train has one Assistant Surgeon-Major, First Class.

The "Annuaire" of the French Army for 1893 shows some changes in the totals and figures given above. The numbers given are as follows:

Medical Director-General.....	1
Medical-Inspectors	9
Principal Medical Officers, First Class.....	40
Principal Medical Officers, Second Class.....	45
Surgeons-Major, First Class.....	313
Surgeons-Major, Second Class.....	479
Assistant Surgeons-Major, First Class.....	296
Assistant Surgeons-Major, Second Class.....	118
Total	1301
Total number of Apothecary Officers of all grades..	115

Aggregate of the "Corps de Sante" for 1893....1416*

HOSPITALS AND INFIRMARIES.

The sick of the different regiments and separate battalions are treated in the regimental infirmaries, or in quarters, according to the circumstances of the case. This treatment is given by the regimental Medical Officers, who attend not only the officers and soldiers of the regiment, but also their families. Cases requiring hospital treatment are sent to the hospitals.

HOSPITALS.

There are thirty-five military hospitals in France, and a large number in Algeria and Tunis. Hospitals are divided into five classes as follows:—

First class, 600 or more beds; second class, 400 to 599 beds; third class, 300 to 399 beds; fourth class, 200 to 299 beds; fifth class, less than 200 beds.

*Apparently they are increasing the number of Medical Officers and diminishing the number of Apothecary Officers.

Among the military hospitals are four "thermal" hospitals, where men can be treated with mineral waters.

In localities where military hospitals do not exist, and in those where they are insufficient, the civil hospitals are required to receive and treat sick soldiers sent to them by the military authorities. To this end civil hospitals are divided into two categories: First, mixed or militarized hospitals (*hospices mixtes ou militarises*); and second, civil hospitals properly so called (*hospices civils proprement dits*). In the first category are classed civil hospitals having wards specially told off to military patients. Whenever a garrison numbers 300 men, the military patients are to be treated in such special wards, and are to be under military hospital regulations. In the second category are classed town hospitals, where the garrison is below 300 men. In this case military patients will ordinarily be placed in the regular wards, if special wards are not obtainable. In a garrison of 1,000 men, the treatment of the sick will be attended to by military medical officers; with a garrison of less number, duty in the military wards is performed by the civil surgeons where the military personnel is insufficient.

In civil hospitals, properly so called, military patients are treated by civilian surgeons. The state pays to civil hospitals all expenditures incurred in its behalf. There is also a regular appropriation made each year for the payment of civilian surgeons.

The personnel of the military hospital establishments comprises, in numbers fixed by the regulations: Medical Officers; Officers of the Hospital Administration; Hospital Orderlies, (*Infirmiers*); Chaplains; Sisters of Charity (*Soeurs Hospitalieres*).

MEDICAL OFFICERS.

There is a Chief Medical Officer to each military hospital, and such number of medical officers as assistants as may be required.

Officers of the Hospital Administration.

These officers are a branch of the Intendance, and under the Chief Medical Officers, administer the military hospital service, have command of the sections of *infirmiers* and the detachments of

infirmiers in the different hospitals. In 1892 they numbered:

Principal Officers of Administration.....	14
Officers of Administration, first class.....	56
Officers of Administration, second class.....	56
Officers of Administration, Adjutants, first class.....	112
Officers of Administration, Adjutants, second class.....	112
Total.....	350

Hospital Orderlies (Infirmiers).

The sections of Infirmiers are for employment in hospitals, ambulances, and medical depots. There are twenty-five of them, distributed as follows: The first nineteen are attached to the Army Corps of the same numbers; the 20th and 21st sections are attached to the 19th Corps (Algeria), making 3 sections to that corps; the 22nd, 23rd, and 24th are attached to the military government of Paris, and the 25th to the military government of Lyons. A detachment, taken from one of the home sections, is on duty in Tunis.

The total number of men in these sections in 1892, was 1,439 non-commissioned officers, corporals and trumpeters, and 3,960 soldiers; aggregate, 5399. Each section comprises: Hospital orderlies for duty in the wards; Orderlies employed as clerks; Orderlies for general duties, such as cooking, cleaning the wards, etc.

Hospital Chaplains.

The budget for 1892 provided for seventy-seven chaplains.

Hospital Sisters.

The same budget provided for rations and clothing for 292 sisters.

Regimental Hospital Orderlies.

There is one "infirmier" per battalion in time of peace, and in addition, there is a corporal detailed to take charge of the infirmary. One of the regimental infirmiers is detailed each week for duty in the infirmary.

The patients in the infirmaries and the convalescents are rationed by the general mess. Such men as are on special diet live in the

infirmary, and the cooking for them is done by one of the cantinières designated by the commanding officer. If there is no cantinière, the men all get their meals from the regular mess.

WAR SANITARY ORGANIZATION OF THE FRENCH ARMY.

The duties pertaining to the sanitary service in the field, are:

1st. To anticipate, prepare, and execute sanitary measures which will insure the health of the command.

2nd. In action, to render first aid to the injured.

3rd. To transport the injured to a place of succor.

4th. To organize ambulance, field and general hospitals.

This service is divided into: (1.) Service of the front; (2.) Service of the rear. The service of the front comprises all those sanitary formations which accompany the troops on the march. The service of the rear comprises all those formations which form a part of the armies in the field, but which do not march with the troops. Distributed in rear of the armies of operations, these formations are not subject to the Army Corps Commanders; they are subject to the Director of Lines of Communication, himself subordinate to the Director-General of Railways and Lines of Communication, and to the Chief of the General Staff.

The Service of the Front.

The service of the front is divided into three echelons, viz:

1. The regimental service, intended to give first aid to the troops when stationary, on the march, and during engagements.

2. The ambulance (field) hospitals, intended to supplement the regimental service during marches and halts, to receive the wounded on the battle-field, and to give them such care that they can be sent to the rear (evacues) promptly.

Each Army Corps possesses: One ambulance hospital or dressing station for each division of infantry; one for the cavalry corps; and one for headquarters.

Each independent cavalry division has one ambulance hospital.

The ambulance hospitals are classed with the fighting train.

3. The field hospitals, intended: To relieve the ambulance hospitals in the evening or the next morning; to continue the

"evacuations" (dispatch of the wounded to the rear); to treat the sick and wounded on the spot; and eventually to re-enforce the ambulance hospitals on the battle-field.

The number of field hospitals assigned to each army corps is fixed by the Minister of War.

Service of the Rear.

The Sanitary Formations of the Rear constitute two groups intended, firstly, for the formation of hospitals on the spot; secondly, for "evacuation" and re-supply and re-fitting. The first group comprises:

(a.) The field hospitals temporarily fixed from time to time in rear zone, to treat on the spot sick and wounded unable to be moved.

(b.) Such of the permanent military and civil hospitals as are found near the lines of concentration, as well as the auxiliary hospitals created by the Aid Societies.

The second group comprises:

(a.) The evacuation hospitals placed at the heads of the different lines of communication. The patients are treated here until they can be sent to the interior.

(b.) The station infirmaries and the infirmaries of the stopping places on the lines of evacuation. They furnish food, care and medicines to the sick and wounded en route, etc.

(c.) Hospital transports, comprising railway evacuation trains, wagon evacuation trains, and hospital transport ships.

(d.) Station magazines established on the lines of communication

(e.) Depots for convalescents and broken down men, established along the lines of march and evacuation in the vicinity of field or evacuation hospitals, to receive such convalescents as do not have to be sent home; these convalescent camps, are established by the Chief of the Medical Service of the Lines of Communication, to receive such men as are sent by the superior commanders.

Sub-Division of the Sanitary Formations.

The infantry division ambulance hospitals are divided into as many sections as there are brigades in the division. A headquarters' ambulance hospital consists of two sections.

Hospitals of Evacuation (field) may be divided into several sections, etc.

PERSONNEL OF THE SANITARY FORMATIONS.

1. "Directions," consisting of Medical Officers of the active list, of the reserve, and of the territorial army; Officers of Administration of the active, reserve and territorial armies; Infirmiers of the active and territorial sections; Teamsters.

2. With the Troops.—Medical Officers of the active list, of the reserve and the territorial army; the Auxiliary Medical Officers; the regimental "infirmiers"; the regimental "brancardiers" (litter bearers); Teamsters of the regimental medical wagons, or with pack mules carrying medical panniers; Teamsters with ambulance wagons.

3. With the Sanitary Organizations.—Medical Officers of the active list, of the reserve and the territorial army; auxiliary medical officers; physicians and apothecaries impressed into service; the officers and cadet-adjutants of the hospital administration in the active, reserve and territorial armies; the "infirmiers" of the active and territorial sections; eventually auxiliary infirmiers detached from other troops; detachments of the military train; ministers of different creeds; eventually Hospital Sisters.

4. The Establishments created by the various aid societies, Red Cross, etc.—delegates, physicians, agents, infirmiers, litter-bearers, according to the decree relating to these societies.

MATERIAL.

For each battalion of infantry, each brigade of cavalry, or group of mounted batteries, one medical wagon for the transportation of medical supplies.

There are small carts attached to cavalry regiments and horse battery groups, for the transportation of the wounded, each to carry a medical pannier.

Ambulance hospitals have various kinds of wagons for different purposes; field hospitals have no ambulance wagons, only vans for the transportation of their supplies.

DIRECTION OF THE SANITARY SERVICES.

1. The Medical Director-General is chief of the entire service.
2. Each army has a Medical Inspector, Director of the Sanitary service.
3. Each Corps "d'Armée" has a Principal Medical Officer, Corps Director; each division has a Principal Medical Officer, or Surgeon-Major, chief of the medical service.
4. The lines of communication of an army have a Principal Medical Officer, chief of the medical service.
5. A fortified place or group has a Principal Medical Officer or Surgeon-Major, chief of the medical service.

CONTROL OF THE PERSONNEL.

Each Director or Chief of Service controls his department. He has authority over all the personnel on duty in the ambulance or other hospitals under his command; and, with regard to these officers and men, he has the same disciplinary powers as other officers of his rank in the army.

OFFICERS OF ADMINISTRATION.

The officer of administration controls, under the authority of the chief medical officer, the administrative service, as well as the order and discipline of the sick and the infirmiers. He, under the same authority, commands and administers the detachment of infirmiers, having the disciplinary powers of a company commander.

REGIMENTAL SANITARY SERVICE.

The regimental sanitary service is intended to give first aid at stopping places, on the march and during engagements. The personnel is constituted as follows:

MEDICAL OFFICERS.

	Active.		Reserve or Territorial.	
	Surgeon-Major.	Assistant Surgeon-Major.	Assistant Surgeon-Major.	Auxiliary Surgeon.
Each regiment of Infantry, Zouaves or "Tirailleurs".....	1	1	1	1
Battalion of "Chasseurs a Pied"	1	.....	1	.....
Regiment of Cavalry or "Chasseurs d'Afrique".....	1	.....	.....	.....
Divisional group of six batteries of artillery.....	.....	1	.....	1
First group of Corps Batteries.....	1	.....	.....	1
Second group of Corps Batteries .....	.....	1	.....	1
Group of three Batteries, Cavalry Division.....	.....	1	.....	1
First Echelon of the Park.....	.....	1	.....	.....
Second Echelon of the Main Artillery and Bridge Train Park.....	.....	1	.....	.....

On a war footing, the regiments of infantry, of cavalry, and the regiments and battalions of artillery, have one "infirmier" per company, squadron or battery; and in each battalion or group of batteries, one of these infirmiers has the grade of corporal.

Each infantry company and each artillery battery has also in the field four bearers. Each battalion and each group of batteries have, besides, one bearer corporal. For a regiment of infantry there is one additional bearer, with the rank of sergeant.

The additional infirmiers required on mobilization are furnished by the reserve; those for the infantry are furnished by the musicians and workmen of the reserve; those for the artillery by the musicians of the artillery schools. The complement is made up by the artillery musicians of the reserve.

The non-commissioned officers of the bearers of infantry are taken from the non-commissioned officers of the reserve, and the corporals from the musicians or workmen of the reserve.

The Chief Medical Officer directs the sanitary service under the authority of the commander of the regiment or battalion. He is aided by other medical officers in the order of their rank: the auxiliary surgeons (who rank as adjutant, non-commissioned officers), aid the medical officers of the active army, the reserve, and the territorial

army. They can in no case become chiefs of the Medical Service.

The regimental infirmiers are exclusively employed in caring for the sick when the troops are stationary or on the march, under the immediate direction of the auxiliary surgeons. In battle they assist the medical officers in organizing and working the dressing stations. They can be temporarily called, in case of urgent necessity only, to assist in the service of the ambulance and field hospitals.

The regimental bearers and the infirmiers, to the exclusion of all other combatants, are entrusted with the duty of picking up the wounded on the battle-field, and of carrying them to the dressing stations. In the discharge of this duty they are directed by the non-commissioned officers and corporals of the bearers.

When a battle is impending, the bearers report to the senior medical officer; after the action is over, they return to the ranks.

When the troops are stationary, the regimental infirmiers are organized, as in time of peace. During actions, the dressing station is established by the medical officers and the "infirmiers" of the battalion or group. It is connected with the firing line by the regimental bearers, who are the only persons entrusted with the duty of moving the wounded back from this line. The musicians of the battalion form a relay between the dressing stations and the ambulance relays.

TABLE OF THE PERSONNEL OF A DIVISION AMBULANCE HOSPITAL AND ITS SUB-DIVISION INTO TWO SECTIONS.

<i>First Section.</i>	<i>Second Section.</i>
1 Surgeon-Maj., active.	1 Surg.-Maj., active.
1 Asst. Surg.-Maj., active.	
2 Asst. Surg.-Maj., reserve or ter.	2 Asst. Surg.-Maj., reserve or ter.
1 Officer of the Administration.	
1 Officer of Administration— supply officer.	1 Officer of Administration.
1 Chaplain.	
1 Student of the Lyons school.	
15 "Infirmiers"—2 non-coms.,	15 "Infirmiers"—2 non-coms.,

	3 corporals, 10 privates.		3 corporals, 10 privates.
49 Bearers—1 non-com.,		49 Bearers—1 non-com.,	
2 corporals,		2 corporals,	
46 privates.		46 privates.	

PERSONNEL OF THE TRAIN.

First Section.

1 Lieutenant of the train,
 1 Non-com. officer,
 1 Veterinarian,
 1 Corporal-quartermaster,
 2 Corporals,
 1 Blacksmith,
 1 Workman,
 1 Trumpeter,
 3 Mounted teamsters,
 34 Teamsters, not mounted,
 4 Orderlies of the train,
 for the mounted officers.

Second Section.

1 Lieutenant of the train,
 1 non-com. officer,

 2 Corporals,
 1 Saddler,
 1 Workman,
 1 Trumpeter,
 2 Mounted teamsters,
 30 Teamsters, not mounted,
 1 Orderly of the train,
 for the Surg.-Major.

Such is the personnel in each part of the sanitary service of this army. The organization is simple, but simple as it is, it demands of each of its members, outside of a knowledge of scientific questions of treatment, a very exact military execution.

In the recent issue of "The Broad Arrow" is the following: "Not the least remarkable evidence of the great progress made by the French in the organization of their army is to be found in the official treatise. 'Reglement sur le Service de Sante de l'Armée en Campagne.' These regulations are marked by a thoroughness and attention to detail, which, if carried into effect in war time, will result in the complete efficiency of their hospital service, and a corresponding diminution of suffering to the sick and wounded. The tactical employment of the Ambulance Service is most carefully treated, and what is remarkable is the provision made for its presence with the most advanced troops."

II.

*THE SANITARY ORGANIZATION OF THE
GERMAN ARMY.*

In accordance with the principle that the maintenance of the efficiency of an army is the essential element of success, and that therefore the care of the troops is one of the most important duties of the commanders and the administration, the greatest attention is paid to sanitary matters by the German military authorities.

In this army—as in all others—the sanitary organization naturally divides itself into personnel and material. The former includes the medical officers, who have the rank of combatant officers, and occupy positions of absolute equality with them; apothecaries who rank with administrative officials; non-commissioned surgeons and apothecaries; hospital stewards, nurses, etc., and in active service the litter-bearers. The sanitary material and institutions are the garrison hospitals and regimental dispensaries, and in war the field-hospitals, communicating and reserve or base hospitals, etc., etc.

PEACE SANITARY ORGANIZATION OF THE GERMAN ARMY.*

The Medical Division of the German War Ministry, is headed by the Generalstabsarzt (Surgeon-General or Medical Director-General) of the Army, whose functions, are about the same as those of the Surgeon-General of the United States Army. In addition thereto he is charged with duties similar to those of an inspector-general of a special arm of the service. He has the rank, pay, and emoluments of a Major-General.

Each of the Army Corps—twenty in number, counting the two Bavarian Corps—has a Surgeon-General (Generalarzt) as Medical Director.† These officers are divided into first and second class, and rank respectively with colonels and lieutenant-colonels.

The Surgeon-General of an Army Corps is the head of the Medical Department in his district, and distributes the medical officers

*Data furnished by the Division of Military Information, Adjutant General's office, U. S. Army.

†There is also one Surgeon-General, Chief of the Frederick William Institute.

as he sees fit. The senior surgeon-major (oberstabsarzt) of each division is appointed Divisional Surgeon. General (Garrison) Hospitals are under surgeons-major, who are appointed Hospital Directors, and they are the commanding officers of the hospital personnel, and have the powers of punishment of a company commander. The sick from all organizations serving in the same garrison enter the same hospital. Berlin and several of the large garrison towns are divided into two hospital districts, with a hospital in each.

The grades below Surgeon-General are Surgeons-Major (Oberstabsärzte), Surgeons (Stabsärzte), and Assistant-Surgeons (Assistenzärzte). Surgeons-Major and Assistant-Surgeons are divided into two grades, First and Second Class. There are also Sub-Surgeons and one year Volunteer Surgeons, who rank as non-commissioned officers (with the officer's sword-knot).

As a rule, a Surgeon-Major is the senior medical officer of a regiment and Surgeons or Assistant-Surgeons, of battalions and smaller detached units, etc. The total number of medical officers proper in the whole army, counting Bavaria, is, according to the last budget, 2068.

Apothecaries.

To the headquarters of each army corps is attached a Corps Staff Apothecary, who superintends, under the direction of the Surgeon-General of the Army, the procurement of medicines, etc., for the dispensaries of the several hospitals in the corps district. Apothecaries (who as before stated belong to the higher officials of the military administration), are appointed by the War Ministry on the recommendation of the Surgeon-General of the Corps. They have the standing of officers, but are without relative rank.

Hospital dispensaries are usually placed under the immediate charge of a medical officer by the chief medical officer. Assistance is given in the dispensaries by one or more one-year volunteer apothecaries, i. e., pharmacists who wish to discharge their liability to military service in this way.

There is a Hospital Administrative Personnel which is recruited from non-commissioned officers with at least eight years' service, and who are divided into Chief Hospital Inspectors; In-

spectors of Hospital Administrations; and Hospital Inspectors.* They need not be, indeed rarely are medical men. Their duties are to take charge of the various medical stores and other material in the hospitals, and they are responsible to the Supply Department for their preservation, &c. These officials have been continued in service notwithstanding the change in hospital administration, which has been transferred from a branch of the military economic department, to a specially instituted department (Medical Division) of the War Ministry.

Bearer Companies.

The Bearer Companies of the war formations are mobilized from the train battalions, and have no existence, or merely a "cadre" in time of peace. There is, however, a large force of "Lazareth gehulpen," or Hospital Assistants, maintained in time of peace, one to each company, battery, &c. They are men who have been trained in minor surgery and in "first aid," and have the rank and pay of non-commissioned officers. The total number on the last budget was 3848.

Sick Attendants.

Suitable men, who have been fairly instructed as soldiers for six months, are detailed, under the direction of the Surgeon-General of the Corps, as Sick-Attendants or Nurses (Kranken-warter), at garrison hospitals, where they are trained for service with field hospitals in time of war. Their number is of course not fixed, but they may be said to vary from 400 to 600. There are a few civilians also hired for this purpose, from 400 to 500 in all.

WAR ORGANIZATION.

The War Sanitary Order of January 10th, 1878, fixes the organization of the Medical Department of the German Army in the field, as follows:—

One Surgeon-General in Chief in Berlin.

One Surgeon-General attached to Imperial Headquarters.

One to each Independent Army.

One to each Army Corps.

One Division-Surgeon to each division.

*Total number in 1888 was 191; 47 of the first, 32 of the second and 112 of the third grade.

Two medical officers are attached to each battalion of infantry (of four companies, about one thousand total strength), and one hospital assistant to each company. Two men per company are trained as litter-bearers. A medical store wagon is attached to each regiment (three battalions). A regiment of cavalry has three medical officers and four hospital assistants—one per squadron. A medical store wagon is also attached. The light artillery has two medical officers for each battalion (of three or four batteries), and a hospital assistant for each battery. The heavy artillery also has two medical officers for each battalion (four batteries), and hospital assistants as in the light artillery. The staff troops have a medical officer and hospital assistant with each unit.

It will be observed from the foregoing that the regimental sanitary organization is very clearly defined. It forms the first line of medical assistance in active service, and its field of work in battle lies between the skirmish line and the collecting stations.

The medical units comprise the regimental aid already described: bearer companies, field hospitals, lines of communication hospitals, and base hospitals.

Bearer Companies.

The bearer companies are integral parts of the train battalions of the Army Corps to which they belong, and are numbered "First Bearer Company of the . . .th Army Corps," &c., &c. One of them is attached permanently to each Division, and one is kept at the disposal of the Corps Commander and is attached to the Corps Artillery. Each is divided into two divisions, each complete in itself. The establishment of a bearer company is:

Medical officers.....	7
Paymaster	1
Apothecary	1
Officers of the train:—	
Captain	1
Lieutenants	2
Under Officers of the train.....	3
Lance Corporals of the train.....	3
Privates, of the train.....	14

Soldier Servants of the train.....	12
Tradesmen	7
Sergeant-Major of the Bearer Company.....	1
Under Officers of the Bearer Company.....	15
Buglers of the Bearer Company.....	2
Lance Corporals and Stretcher Bearers.....	176
Hospital Assistants.....	8
Sick Attendants.....	8
Total	261
Horses:—Officers, &c., Riding.....	13
Troop Riding.....	6
Draught	26
Spare Draught.....	2
Total horses.....	47
Carriages:—2-horse	13

The carriages of a Bearer Company are: 8 ambulances, 2 medical store wagons, 2 baggage wagons and 1 provision wagon—all 2-horse. The ambulances are of the 1872, 1874, or 1877 patterns, and can carry 2 severely and 3 slightly wounded men. Wagons of the former patterns are equipped with 7, those of the 1887 pattern with 9 stretchers; so that a Bearer Company with old equipment has 56, that with new, 72 stretchers. With each stretcher a knapsack containing dressings is supplied. On each of the wagons of a Bearer Company are carried 2 shovels; 1 pickaxe; 1 axe and 1 hatchet.

In action the Bearer Companies form the second line of assistance. They work between the collecting stations established by the regimental medical service, and the dressing stations formed by themselves.

Field Hospitals.

The field hospital constitutes the third line of medical assistance. For each Army Corps of two divisions are mobilized 12; for each corps of three divisions, 18 field hospitals, each of which can

receive 200 wounded or sick, and can be divided into two sections. The establishment of a field hospital is as follows:—

Surgeons-Major	2
Assistant Surgeons.....	3
Total Medical Officers.....	5
Apothecary	1
Hospital Inspector.....	1
Accountant	1
Assistant Apothecary.....	1
Total Officials.....	4
Sergeant Ward-Master.....	1
Under Officer Clerk.....	1
Under Officer Store Keeper.....	1
Hospital Assistants.....	9
Sick Attendants.....	12
Cook	1
Transport Under Officers.....	2
Transport Lance Corporals.....	2
Transport Trumpeter.....	1
Transport Drivers.....	9
Officers Servants.....	8
Total Non-Commissioned Officers and men..	47
Horses*—Officers Riding.....	5
Troop Riding.....	5
Draught ..	20
Total Horses.....	30
Carriages*—2-horse baggage wagon.....	1
2-horse medical store wagons.....	2
4-horse material and store wagons...	3
2-horse carriage for officials.....	1
Total carriages.....	7

*Field hospitals may also be equipped with four 2-horse material wagons, and one 2-horse ambulance wagon, in place of the 4-horse material and store wagons; in which case they have 28 horses and 9 carriages.

The medical store and baggage wagons are the same as those of Bearer Companies. In the material and store wagons are carried the hospital stores required, and a coverlet and a pair of sheets for each patient; but no other bedding, which is obtained locally by requisition, and no tents. All stores have been reduced to the lowest possible number, so as to diminish the transport and increase the mobility of these hospitals.

The lines of communication and war hospitals are as a general rule taken charge of by the auxiliary societies for aid to the wounded. For the war hospitals which are formed to take over the wounded which can not be moved when the field hospitals start to follow those Corps, each Army Corps mobilizes 19 medical officers, 3 apothecaries, (6 other officials), 27 hospital assistants, 3 under officers, 36 sick attendants, 24 train soldiers and 3 cooks.

All persons in medical units wear the Geneva Cross on the sleeve, above the elbow on the left arm.

TABLE OF WAR SANITARY PERSONNEL AND TRANSPORT.

UNITS.	Medical Officers.	Train Officers.	Officials.	Non-Com. Officers and Men.	Horses.	Carriages.
63 Bearer Companies	441	189	126	15,687	2,961	819
258 Field Hospitals	1,290	.....	1,032	12,126	7,740	1,806
20 War Hospitals	380	.....	180	1,860	.....	.....
Totals	2,111	189	1,338	29,673	10,701	2,625

III.

SANITARY ORGANIZATION OF THE AUSTRO-HUNGARIAN ARMY.

In peace, the Sanitary Corps consists of the headquarters and twenty-six sections. In war, in addition, it consists of field and reserve sanitary sections formed upon "cadre" furnished from the peace establishment, and of sanitary sections from the hospitals of the order of Teutonic Knights.

Each sanitary section is assigned to a garrison hospital, and is known by its number, which is identical with that of the military division to which it is attached. The sanitary corps is commanded by a special corps of officers, non-medical, and its strength is, in peace, 83 officers and 2,834 men; in war, 400 officers and 21,200 men.

The sanitary establishments and personnel are as follows:

MILITARY SANITARY ESTABLISHMENTS.*

These establishments are for the reception and treatment of the sick and wounded, and are divided into:

A. Permanent Sanitary Establishments, consisting of:

1. The Garrison hospitals and branches.
2. The Troop hospitals.
3. The Infirmarys.
4. The Military bathing and water-cure establishments.
5. The Fortress-hospitals.

B. The Field Sanitary Establishments, consisting of:

1. The Divisional Sanitary Establishments.
2. The Field-hospitals.
3. The Field-infirmaries.
4. The Reserve-hospitals (on the theatre of war).
5. The Halting-places for the wounded on the line of march.
6. The Field ambulances (railway, ship-ambulances, etc.)

In the Field Sanitary Establishments may also be included the reserve hospitals exterior to the theatre of war, the reserve hospitals and convalescent establishments provided by patriotic societies or private individuals, and finally the "Clothing and Sanitary Material Field Depots."

Of these, the Divisional Sanitary Establishments belong to the reserve of the 1st Line; the remaining establishments to the reserve of the 2d Line. The military sanitary establishments are under the direction of military medical officers, and are assigned to divisions of sanitary troops, or men who have been trained as "bandage and litter-bearers, for carrying out the hospital service." The sick,

*Report of Capt. Otto L. Hein. First U. S. Cavalry, military attaché, at Vienna, Austria.

wounded and hospital personnel are required to obey all orders given by Medical Officers, pertaining to the sick, and the performance of duties in the hospital.

The Senior Medical Officer is, however, only invested with disciplinary power of punishment over his subordinate medical officers, except when in charge of a railway or ship ambulance, when he also exercises this power over the enlisted sanitary personnel.

The military command over the entire personnel of the establishment, belonging to the combatant strength of the army, is exercised by the commandant of the sanitary division attached to the hospital. Those establishments which have no sanitary divisions, are assigned regimental subaltern officers for the exercise of military command; and these officers have the disciplinary power of punishment over the personnel of the hospital belonging to the combatant strength of the army.

The reports and records of a sanitary establishment are signed jointly by the Senior Medical Officer, and commandant of the sanitary division; but matters pertaining solely to the functions of either only require the signature of the one concerned.

A. PERMANENT MILITARY SANITARY ESTABLISHMENTS.

1. Garrison Hospitals.

These establishments are organized at all large garrison stations, and in addition to their other duties, are charged with the training of surgeon volunteers for the medical service and the assistant sanitary personnel.

There are at present twenty-six Garrison Hospitals, two in Vienna, two in Pesth, and one at each of the headquarter stations of the 1st, 3d, 5th and 13th Corps, and at Linz, Olmütz, Theresianstadt, Bruner, Comorn, Loibash, Trieste, Ragusa and Mostar. Some of these hospitals have branches. They are numbered consecutively, for example: "Garrison hospital No. 7, Grau," "Garrison hospital No. 11, Prague—Branch Headochin." On mobilization, the garrison hospitals furnish the divisional sanitary establishments, field hospitals, railway sanitary trains, and ship-ambulances.

Every hospital is an independent establishment, under its own staff of medical officers, chaplains and accountant-officers, and a sanitary division. A medical officer, with the rank of field-officer, is in charge, and a captain or lieutenant of the "Armée Stand" superintends the administration and economical service. The latter duties, in the case of the smaller garrison hospitals, are performed by an officer of the sanitary division.

There is an apothecary attached to every garrison hospital.

In military and administrative matters, these hospitals are subordinate to the Brigade Commanders. They are enlarged on mobilization to afford accommodations for a maximum of 1,000 patients.

2. The Troop Hospitals.

A troop hospital is established in every military station with a garrison of more than 500 men, but which has no permanent garrison hospital; and is charged with the treatment of the sick and the training of litter and bandage bearers (one non-commissioned officer and three privates per company). They are independent establishments, with an organization similar to that of a garrison hospital; but their staff is not exclusively attached to them, but is furnished from the regiment or corps from which their patients come.

A regimental medical officer is in charge, and a line officer is assigned for the supervision of military order and discipline, as well as for the management of its economical administration. The nurses and attendants are detailed generally from those members of the regiment who have been trained as bandage and litter bearers, but are sometimes furnished by the sanitary troops (a regular organization, one company of which is attached to each army corps).

On mobilization, the troop hospitals are enlarged for the reception of the sick and wounded, and are designated Reserve-hospitals, or Fortress-hospitals in case they are located in fortified places; additional troop hospitals are organized in some of the recruiting-district stations, to provide for the increased demands incidental to the mobilization of the army. The hospitals of the military schools, of the invalids, and of the military prisons, are organized on a similar model, but form an integral part of these establishments.

The invalid hospital at Thenau has a special branch for the treatment of the insane.

3. *Military Infirmaries.*

In garrisons numbering from 300 to 500 men, infirmaries may be established by order of the military Territorial Commanders, for the reception and treatment of light cases, and also severe cases, in case the removal of the patient to a regular hospital is not possible. Infirmaries may also be established on special occasions, such as a large concentration of troops or the breaking out of epidemic or contagious diseases, for such periods as may be necessary.

The medical officer in charge and hospital personnel are detailed from the strength of the regiments. A line officer is assigned to each infirmary for the supervision of its military and administrative service.

The duties of nurses and attendants are generally performed by bandage-bearers, and exceptionally by sanitary-soldiers.

The military infirmaries form subdivisions of their respective regiments. Those located in the receiving-districts are enlarged on mobilization, or disbanded, if not needed.

4. *Military Bathing and Water Cure Establishments.*

These establishments are organized at the more important Springs; as Baden, near Vienna; Karlsbad; Schonau, near Toplitz in Bohemia; Mehodia; Hof-Gastein; Pystian; Toplitz, in Hungary; Buda-Pesth; Topulsko, in Croatia; and Toplitz, in Corinthia; and are for the treatment of special cases. Some receive only officers; some both officers and men, and some only men; and they vary in system and treatment.

Most of these establishments are only open during the summer season, and are provided with the necessary staff and attendants from the garrison-hospitals, or from the sanitary troops. Every establishment is under the direction of a medical officer.

In Karlsbad, Schonau and Mehodia, field officers of the retired list are permanently in charge as "Military Bath-house Commandants"; in the other cures, officers are detailed as commandants during the bathing season as "Military Bath-Inspectors." In war,

the military bathing establishments may be enlarged for the reception of the sick and wounded from the front.

5. *Fortress Hospitals.*

In those fortresses of the empire which are in a state of preparation for defence, such as Cracow, Przemysl, &c., provision for hospital accommodation is based upon the requirements of their increased garrison on mobilization.

Fortresses which contain garrison-hospitals enlarge them, and eventually establish branches sufficient for the reception of a maximum of 1,000 patients. If the estimated number of patients exceeds 1,000, fortress-hospitals are established.

Fortresses which have troop hospitals or infirmaries in time of peace, convert these into fortress-hospitals on mobilization. Those which have small garrisons, and insufficient even for the erection of fortress hospitals, enlarge their infirmaries to the extent that may be necessary. The fortress-hospitals are administrative and independent sanitary establishments, and have a special personnel attached to them.

Mobilization for Active Service.

The passage from the peace to the war establishments is effected by organizing the Divisional Sanitary Establishments and field hospitals, railway sanitary-trains, and ship-ambulances, preparing halting stations on the lines of communication for the wounded, furnishing the clothing and sanitary material; and finally by enlarging the fortress sanitary establishments.

Strength of the larger Garrison Hospitals.

The personnel of the Vienna hospital consists of:—

Medical Officers	12
Officers of the Armeestand.....	2
Chaplain	1
Accountant Officer.....	1
Officers' Servants.....	16
Principal Division,—Officers.....	4
“ “ Men.....	190
Instruction Division,—Officers.....	1
“ “ Men.....	59

Total (21 officers and 265 men).....286

This is the largest hospital in the Empire. The smallest garrison-hospital, at Ragusa, has a personnel of:—

Medical Officers.....	3
Chaplain	1
Accountant Officer.....	1
Officers' Servants.	5
Principal Division,—Officers.....	2
" Men.....	34
Instruction Division,—Officers.....	1
" Men.....	17

Total (8 officers and 56 men)..... 64

The total strength of the twenty-six garrison-hospitals amounts to 274 officers and 3,025 men.

B. FIELD AND SANITARY ESTABLISHMENTS.

The principal object of the sanitary service in the field is to transport the wounded from the battle-field as rapidly as possible to the sanitary establishments in the rear, where they may receive thorough surgical treatment and regular hospital care; and to distribute the sick and wounded over as large an area as possible in the interior of the Empire.

The wounded are first collected by the litter-bearers, and given such assistance and care as may be possible. In the first dressing the bearers utilize the bandage-packets with which every soldier is furnished—(carried by the cavalry and train troops in the upper right hand blouse pocket, and by all other troops in the left hand trousers pocket). Each packet contains the following articles wrapped in a piece of vellum:—piece of iodized muslin, 3 to 4 grammes of cotton, a compress, bandage, and piece of water proof.

As the cavalry, artillery and technical troops have no bearers, the duties of the latter are performed by sanitary soldiers.

As a rule, one collecting-station is established for every infantry brigade, about 1,000 paces in the rear of the center of the fighting line. There the wounded receive only such assistance as may be necessary for their removal to the dressing-station.

The dressing-station is established from 3,000 to 5,000 paces in the rear of the center of the fighting line of the division, in or near large buildings or in tents. Here the wounded of the division are collected, and receive their first surgical treatment, after which they are either carried in the ambulance wagons to the ambulance hospital or are removed at once to the field hospitals in the next line, or if possible directly to the permanent hospitals. To avoid unnecessary and repeated examinations of the wounded, they are provided with diagnosis cards, giving the nature of the wound, treatment received, and condition for transportation, attached to a blouse or great-coat button. If the distance to the next sanitary establishment, railway-station or ship-landing is too great to be covered in one march, a connecting link (an ambulance hospital) is established where the wounded are refreshed, and their bandages rearranged if necessary. When the ambulance hospital (one to each division of infantry) is not needed for this purpose, it is sometimes combined with the dressing-station.

The field-hospitals are mobile establishments, transported by wagon, one being allowed for every division of infantry. They follow the movements of the army, and are only established when needed, being located if possible in large buildings as far to the front as possible, from 10,000 to 15,000 paces in the rear of the fighting line.

To render the field hospitals able to follow the marching columns, the necessary measures are taken at the time of their establishment to evacuate them as soon as possible, by sending the wounded to the permanent hospitals in the rear. The transportation of the wounded from the field-hospitals to the rear is effected by means of ambulance or other wagons fitted up for the special purpose; by rail, on the sanitary trains, for severe cases; and temporary sanitary trains, for light cases; by water, in the ship-ambulances. "Halting stations" (*tranken-halt-stationen*) are established at suitable points on the lines of communication, for the purpose of giving a short rest to men journeying to the rear, of providing them with medical relief, refreshments, etc.

For the reception of the wounded incapable of transportation, stationary or reserve hospitals are established in place of mobile sanitary establishments. Light cases and convalescents are placed in the field infirmaries established on the theater of war. The sick and wounded sent home are distributed among the military sanitary establishments existing in time of peace, the reserve hospitals newly established beyond the theater of war, and finally the hospitals and convalescent establishments organized by private societies and individuals. The distribution of the wounded is regulated by the Minister of War.

A volunteer sanitary service, already organized in time of peace, co-operates extensively with the military service, in war.

The uniform and equipment of the bearer detachments are the same as those of the respective corps to which they belong, their distinguishing marks as bearers being a black and yellow band worn above the left elbow. The non-commissioned officers are armed with their rifles, the privates wear a sapper's sword, and carry a pouch filled with bandages and a large canteen of water. As soon as they have performed their work on the battle-field, they return to their respective organizations. The company bearer belongs to the combatant class and is not neutralized.

The flags employed to designate the field sanitary establishments, the arm bands worn by the sanitary personnel, and the sanitary wagons, all bear the Geneva cross. The flags are placed alongside of the national colors (black and yellow).

I. Divisional Sanitary Establishments.

When the army is mobilized, a Divisional Sanitary Establishment is organized for every division. The duties are, to render the first surgical treatment to the wounded, and to transport them from the relieving to the bandaging-stations, and from there to the next line of sanitary establishments.

The field sanitary establishments of the forty-eight infantry divisions and eight cavalry divisions are numbered consecutively with their respective divisions; for example: "Infantry divisional Sanitary Establishment No. 36;" "Cavalry Divisional Sanitary Es-

tablishment No. 4." These establishments are directly subordinate to their respective division commanders, and are under the supervision of the division chief medical officers.

Infantry Divisional Sanitary Establishments.

Every Infantry-Divisional Sanitary Establishment is equipped for forming:—

Relieving (collecting) stations.....	2
Bandaging (dressing) station.....	1
Ambulance (field hospital).....	1
Sanitary material reserve.....	1

Each has a staff of medical officers, and a field sanitary division. During and after battles, until the establishment is evacuated, the regimental medical officers of the division are also on duty with it.

The surgical duties at the collecting and dressing stations are performed by the regimental medical officers, under the supervision of the division chief medical officer, who generally is stationed at the central point,—the dressing station.

As a rule, the senior medical officer and the next two in rank of each infantry regiment, are designated for attendance at the dressing-stations, and the remaining regimental medical officers at the collecting stations. To each divisional establishment is also assigned a field sanitary column of the "Teutonic Order. The horses of the ambulance and other government wagons are furnished by the First Zug of the train squadron attached to the division.

The maintenance of military order and discipline in the establishment, and its economical administration, are in charge of the commandant of the field sanitary division.

The ambulance (hospital) either co-operates directly with the dressing station, or serves as a connecting link between the latter and the sanitary establishments in rear. When the troops remain in cantonment for a considerable period, the ambulance (hospital) may be employed as an infirmary, by order of the division commander.

The sanitary material reserve contains a supply of medicines and dressings for replenishing the stores which have been expended

at the collecting and dressing stations. The stores of the sanitary material reserve are replaced by the clothing and sanitary material field depots. The field sanitary column is generally attached to the divisional ambulance (hospital). The sanitary soldiers of the column are furnished by the field sanitary division; the train soldiers and government horses, by the train squadron.

The divisional sanitary establishments of the First, Eighth, and Eighteenth Infantry Divisions are organized especially for mountain warfare. The infantry divisional sanitary establishment usually marches at the head of the baggage-train of the division, in the normal order of march.

The collecting and dressing station division and wagons, under command of the commandant of the field sanitary division, belong to the fighting train; but the ambulance and sanitary material reserves and wagons, under command of the 2nd officer of the field sanitary division of the Teutonic Order, are with the baggage train.

At a halt, or in camp, the infantry divisional sanitary establishment is employed as a collecting-point for the sick and wounded who are designated to be sent to a hospital. Men unable to travel are placed by order of the medical officers in the wagons of the establishment, and upon arriving in camp are sent back to their regiments. When their number is too great to admit of all being put in the wagons of the establishment, the least exhausted are relieved of their arms and accouterments, which are placed in the wagons, and some sanitary soldiers are left back with them.

The medical officers of the establishment always remain with the hospital wagons during the march. Four mounted staff cavalry orderlies are attached to every establishment during battle, to establish communications quickly between the dressing-stations and the ambulance (hospital), and the collecting-stations and troops, and to carry orders, etc.

The collecting-stations are placed at a shorter distance from the fighting line in a covered or hilly country than in an open country; the mean distance being 1,000 paces, because this is as far as the bearers are able to carry the wounded rapidly without having to

stop to rest. Each collecting-station is placed as near as possible to the line of retreat of its brigade, so as not to interfere with the advance of the troops who have not yet come under fire, and must if practicable be upon a wagon-road connecting with the dressing-station.

Buildings, hollow ground, trees, &c., which afford protection against direct fire and the glaring light of the sun, with water, straw, wood, &c., in the neighborhood, are the points recommended for establishing the collecting-stations. But as these advantages are seldom found combined, the stations will generally be in the open, where the existing facilities must be utilized to the best advantage. Each station is marked by day by two flags, one with a red cross on a white field, and the other containing a horizontal black and yellow stripe; and by night by a white lantern with a red cross.

The dressing-station is established near the line of retreat of the division, and 3,000 paces is its minimum distance from the fighting-line, under the most favorable circumstances. When possible, it is located in a building or shed; the essentials being ample wood, water, and straw in its vicinity, an easy exit, wagon communications, &c. It is marked similarly to the collecting-stations. When located in the open, the hospital and field sanitary column tents are pitched for its use.

The hospitals are generally located in the orders for the disposition of troops issued by the chief of staff of the division on the eve of battle, otherwise by the division chief medical officer.

The ambulance (hospital) is combined with the dressing-station when the field hospitals are so near the battle-field that the wounded can be sent directly to them, or when the dressing-station is established on a railway or river, and it is possible to transport the wounded directly to a distant reserve or distributing hospital.

Composition of an Infantry Divisional Sanitary Establishment.

- (a.) Medical Officers—Chief and two assistants.
- (b.) Sanitary Division—2 officers and 75 men.
- (c.) Train-division—Wagons, horses and drivers from the

Train-troops. Commandant: a sergeant-major. Strength: 50 men, 10 horses (including 5 for the medical and sanitary officers).

(d.) Field Sanitary Column of the Teutonic Order.

From the sanitary troops, 1 corporal, 12 men;

From the train-troops, 1 corporal, 12 men, 23 horses;

From the Teutonic Order, 4 ambulance wagons and 1 sanitary wagon packed with sanitary material.

The clothing, equipments and arms of the men, besides the entire train and sanitary stores, are provided and replenished by the Teutonic Order.

(e.) 4 mounted staff cavalry orderlies, during battle.

(f.) Total strength of an Infantry Divisional Sanitary Establishment: 3 medical officers, 2 sanitary officers, 158 men, 113 horses and 25 wagons.

(g.) Distribution of the personnel, horses and wagons among the sub-divisions of an Infantry Divisional Sanitary Establishment:

(1.) Collecting-stations:

6 to 8 regimental medical officers (only during battle).

1 N. C. Officer and 17 men of the Sanitary Division.

1 N. C. Officer, 18 men, 1 riding and 16 draft horses, and 4 ambulance wagons of the train-troops. The N. C. Officer of the Sanitary Division is commandant of the relieving station division.

(2.) Dressing-station:

9 to 13 regimental medical officers (only during battle); commandant and 39 men of the sanitary division; 2 non-commissioned officers, 16 men, 23 horses and 5 wagons (including 2 hospital wagons of the train-troops.)

For the transportation of the wounded to the rear from the dressing station are also employed the empty wagons returning from the battle-field, requisition-wagons, &c.

(3.) Ambulance (hospital) including field sanitary column of the Teutonic Order:

3 Medical Officers.

1 officer and 33 men from the train troops.

23 men, 40 horses and 8 wagons from the train-troops.

(4.) Sanitary Military Reserve:

1 Sanitary officer, 4 train-soldiers, 8 draft horses, 2 4-horse sanitary-material wagons.

Cavalry Divisional Sanitary Establishment.

Every cavalry divisional sanitary establishment is equipped for forming one collecting and one dressing-station. These stations are generally combined.

Composition:

A. Medical Officers: The surgical treatment of the wounded is formed by the regimental medical officers of the cavalry, as the establishment is not provided with a medical staff.

B. Sanitary Division: This division not only furnishes the attendants and nurses, but also provides bearers for the regiments. Its strength is one sergeant-major and 17 men.

C. Train Division: The wagons, horses and drivers are provided by the train-troops.

Strength: 1 sergeant, 12 men, 23 horses, 6 wagons, including 4 4-horse ambulance wagons for the transportation of the wounded from the relieving to the bandaging-station. The wounded are conveyed to the hospitals in rear by means of hired wagons.

Total strength of cavalry divisional sanitary establishment: 31 men, 23 horses, and 6 wagons.

On the march, in camp and cantonment, the duties of this establishment are similar to those of the infantry divisional sanitary establishment. The position of the collecting and dressing-station is generally designated by the division chief of staff.

II. The Field Hospitals.

In these establishments the wounded receive their first thorough medical treatment. Forty are established by the army, and two by the volunteer sanitary service, on mobilization, at the rate of one per infantry division. They are not specially attached to particular army corps, but are directly subordinate to the chief of staff, who assigns them, when necessary, to corps; the latter placing them at the disposal of the divisions of infantry.

Every field hospital can accommodate 600 patients, and is divided into 3 sections, each complete in itself, and capable of holding 200 wounded men. Every hospital is furnished with a suitable number of medical officers, chaplains, accountant-officers, apothecaries, and a field sanitary division and dispensary. The sanitary material, bedding, clothing, &c., are carried in government wagons especially arranged for that purpose, and horsed by hired teams. A transport column of the Red Cross Society is assigned each hospital for the transportation of the wounded to the rear.

Composition of a Field Hospital.

(a.) One Chief and 9 regimental medical officers, 1 military chaplain, 3 accountant officers, 3 apothecaries, 1 armorer (to take charge of the arms and accouterments of the wounded).

(b.) Field sanitary division.—1 field officer as commandant, 2 captains or lieutenants, 177 men.

(c.) Train-troops.—2 blacksmiths and 4 four-horse teams for the transportation of the hospitals.

(d.) 5 two-horse wagons for the transportation of the officers and officials.

(e.) 112 hired horses for the wagons, and 56 civilian drivers under charge of mounted civilian foremen.

(f.) The transport column of the Red Cross Society, consisting of 15 two-horse ambulance wagons, and 1 four-horse wagon containing sanitary stores furnished by the volunteer sanitary service. The horses, 36 in number, are hired.

A sanitary division, consisting of 24 Landwehr or Landsturm men, under the command of a non-active officer, forms the personnel of this column.

(g.) The total strength of a field hospital, including transport column, amounts to: 21 officers, 276 men, 149 horses, and 45 wagons.

III. Field Infirmaries.

The field infirmaries are established at suitable points on the theater of war, or on immediately adjoining territory, for the reception of light cases, convalescents and broken-down soldiers in need of temporary rest, and to avoid the necessity of sending them to more

distant sanitary establishments. Their number and extent are regulated in accordance with the temporary necessities of the service; but there must be at least one field infirmary for each Army corps, with accommodations for not less than 500 patients. Each infirmary has one medical and one sanitary officer, two men of the sanitary troops, and a number of horses and attendants furnished by the etapen-troops on those lines of communication upon which the regular traffic between the army and the interior takes place.

IV. Reserve Hospitals.

(a.) On the Theater of War.—Reserve hospitals are intended for supporting or replacing the field hospitals, to enable the latter to be pushed again as rapidly as possible in advance for the immediate reception of the sick and wounded sent from the field and field hospitals, and for the temporary reception of the sick and wounded sent to the collecting-point for transportation to the rear. Their number and capacity is regulated in accordance with the requirements of the service, but there must be at least one reserve hospital for 200 patients for every division. Their personnel and material are furnished from the reserves, under the orders of the chief of intendence; and field apothecaries, and the means of transportation are furnished when needed. They are numbered consecutively, and are subordinate to the chief of intendence of the army. A reserve hospital for 200 patients has one medical officer, one chaplain, and one apothecary, besides one officer and 78 men of the sanitary troops.

(b.) Exterior to the Theater of War.—Reserve hospitals are also established in the interior, for which purpose, the localities and arrangements of the troop hospitals and infirmaries may also be employed. They are organized after the manner of the garrison hospitals, and are classified as field sanitary establishments. They are named after their respective stations, as for example: "Reserve hospital at Zuain."

V. Halting Places for the Sick and Wounded.

These stations are established at intervals on those lines of communication (etapen lines) upon which the transportation of the sick and wounded takes place, and are for the purpose of giving a

short rest to men proceeding to the rear, and of providing them with medical assistance. There are two classes of these stations:

(a.) Stations where men passing through receive refreshment and attendance, but with no sleeping accommodations;

(b.) Stations with sleeping accommodations, and furnishing regular medical treatment.

The former are established at those railway stations where long stops take place. The comfort of the wounded is attended to by the etapen service, and medical treatment by civilian physicians. The latter are established at those railway stations from which trains are dispatched, and at all stations on the road, at which the transportation must stop over night. The personnel and material of the halting-stations are furnished by the intendence of the army. Two stations, each accommodating 200 men, are provided for every army corps. There are numerous halting-stations besides, which are established by the Volunteer Sanitary Service. A section for 200 patients has one medical officer and one non-commissioned officer and six men of the sanitary troops. The horses and attendants are furnished by the etapen troops.

VII. Ambulance Field Sanitary Establishments.

These are mobilized in war and are divided into "railway sanitary trains," "improvised sanitary trains," and "ship-ambulances." They are for the purpose of transporting the severely wounded from the field and reserve hospitals, and directly from the divisional sanitary establishments, to the permanent hospitals in the interior of the empire. They are independent establishments, and have a staff of medical officers and apothecaries, and a field sanitary division, besides the necessary means for the care and refreshment of the wounded during the journey.

Railway Sanitary Trains.—At least twenty-six are mobilized by the army, and six to twelve are provided by the "Order of Malta." Every train can accommodate 104 patients.

Temporary Sanitary Trains.—These improvised trains are formed for the reception of light cases, in case the railway sanitary trains are insufficient to accommodate them. Merchandise and passenger wagons, fitted up temporarily for the purpose, are used.

Each train has a medical or combatant officer in charge, its sanitary personnel and material being drawn from the reserve under the Chief of Intendence. Refreshments and medical attendance are only furnished at stopping-points.

Ship-Ambulances.—Tow-boats are organized and equipped as movable hospitals, in case of necessity, for the transportation of the wounded on the Danube, Thein, Drau and Save Rivers. Each boat can accommodate from 116 to 123 patients, and has a personnel consisting of two medical officers, one apothecary, two non-commissioned officers and 25 men of the sanitary troops.

VII. Clothing and Sanitary Material Field Depots.

These depots are charged with supplying sanitary material, clothing equipment and field supplies to the troops and reserve establishments of the field army; also to those sanitary establishments (field infirmaries, reserve hospitals, halting-stations, &c.), which are created when necessary, by the Chief of Intendence.

Each army, and independent corps, or division, is allowed one clothing and sanitary material depot.

IV.

*THE BRITISH ARMY MEDICAL STAFF AND THE MEDICAL STAFF CORPS.**

Up to the Sixteenth Century, the value of military surgeons was gradually being acknowledged in England, but the temper of the times in regard to their encouragement may be estimated from what we read in Gore. "The poor soldiers, when severely wounded, were discharged with a small gratuity, to find their way home as best they might." This practice prevailed as based on the principle that "it cost more to cure a soldier, than to buy a recruit."

At the time of the formation of a standing army, and towards the end of the Stuart period, the ranks of the medical officers were: Regimental Mate, Hospital Mate, Regimental Surgeon, Apothecary

*From the Army Book of the British Empire, 1893.

to a general hospital, Surgeon to a hospital, Surgeon General. A distinction of some importance between a physician and a surgeon was also made at this time, and existed till the middle of the eighteenth century, so much so that not unfrequently, during Marlborough's campaign in Germany, we read of the commander-in-chief promoting a surgeon to be a physician; and, as late as 1764, Brocklesby wrote how necessary it was that the military surgeons should be educated as physicians. The two services, naval and military, were not so distinct during this period as they are now. Sir Thomas Longmore, in his "Life of Wiseman," writes: "Officers of all branches of the military service, and of all ranks, occasionally held commissions for sea service at one time, and at another time for service on land." During the campaigns of Marlborough it was generally considered effeminate to be ill, but eventually the terrible battles of that time, and the fever-stricken countries in which operations were carried on, gave the fighting man the benefits to which he was entitled.

At that period the clever administration, indomitable courage, and perseverance of the senior medical officer, Sir John Pringle, kept the medical service prominent, and under the greatest difficulties, proved absolutely the necessity for the presence of a proper proportion of the relieving element to the fighting strength. Medical officers then, and until 1796, not unfrequently held double commissions and could act in the double capacity of captain and surgeon. Sir John Pringle, the surgeon general serving with the troops under Marlborough, initiated the system of regimental, field, and general hospitals; and the records show that after the battle of Fontenoy, on the 11th of May, 1745, a general hospital was opened at Ath, which took in upwards of 600 wounded. In the same war, a general hospital was opened at Ghent, which received 1500 sick and wounded.

The first assignment of medical officers and their hospitals to an army in the field, in anticipation of their being used, was in the Peninsula. Sir J. McGrigor, afterwards Director General, was the principal medical officer. The idea was that every regiment should take care of its own sick, and in this way the crowding of

large numbers in the general hospital was avoided. This scheme answered its purpose then, as is proved by the fact that in the interval between the siege of Burges and the battle of Vittoria (some ten months) the total number of sick and wounded passed through the hospital was 95,348; yet by the assiduous care of the medical officers there were only 5000 sick on the eve of the battle, the ranks being recruited by convalescents who had been properly treated and returned to duty. This war produced many improvements, which were, however, chiefly confined to the interior economy and administration of general and regimental hospitals; while the organization, personnel and general character of medical establishments scarcely underwent any change.

Indeed, there was at this period no ambulance corps in the British service corresponding with the medical staff corps of the present times. A corps called the "Royal Waggon Train" was organized in 1812 for general transport and commissariat purposes. Wagons with springs were especially designated, as part of its equipment for the carrying of sick and wounded men. It afterwards proved defective, and was broken up in 1833.

On the outbreak of the Crimean War, the "Hospital Conveyance Corps" was originated. This corps was for the most part recruited from military pensioners and other non-effectives. Their duties were to carry the wounded from the battle-field to places of safety, and to supply general and other hospitals with attendants, so as to prevent drawing on the effective ranks; they also had to take charge of the transport, and to furnish servants for the officers of the general medical staff of the army. This establishment failed, owing, amongst other reasons, to the total want of training of the men of the corps for such varied service, to their not having been accustomed to work together, to their loss of activity from age, and their general drunken and disorderly habits. Indeed, before the actual hostilities had commenced, fresh men were enrolled and a new system organized. The medical staff officers overlooked in a general manner the work of the hospital conveyance corps; but there was no system of command, and neither discipline nor authority could be directly enforced by them.

In the beginning of 1857, after a short interregnum, when the Land Transport Corps carried out the duties connected with the executive of military hospitals, there was practically no ambulance system. There were physicians and surgeons attached to corps, and there was a general medical staff service, but there was no cohesion, nor organization which would work. This was moreover impossible for many reasons, not the least important of which was the absence of medical supplies and appliances. It must be observed that the transport of the sick, which the Land Transport Corps had undertaken, is only one of the functions of a medical corps; the other and most important duties:—viz., those of the conveyance of the wounded from the field of battle on stretchers, and of attending the sick and wounded in hospitals,—still remained to be provided for in other ways. But as the military medical officers had no connection with the Land Transport or any other corps, this provision was rendered more difficult. The regimental orderly system, which had been in existence since the days of the Peninsular War, worked fairly well under the regimental medical officers: but it was open to disadvantages which rendered it necessary that the sick attendants generally should be supplied from other services.

By royal warrant, June 11th, 1855, the first Medical Staff Corps was organized. It consisted of nine companies, each 78 strong, and arranged so as “to be employed in any way that may be required in the performance of hospital duties.” There was scarcely any military feature in its organization: this fact alone materially facilitated its downfall, which occurred three months later, notwithstanding the provisions of a second warrant. The Army Hospital Corps was organized in its place on December 20th, 1855.

The failure of the Medical Staff Corps was mainly due to the doubtful and anomalous position in respect to its relations with the combatant authorities. The men of the Corps for the most part acted in hospitals under medical officers who were not invested with military authority, and who had no power of awarding punishment for offences. In a considerable proportion of their numbers, they were undrilled and untrained in the strict requirements of discipline;

and this was not so only as regarded the men of the corps, but also of the stewards and ward-masters, under whose supervision the duties were performed. Though having the relative rank of non-commissioned officers, they neither wore the ordinary distinctions of those ranks on their uniforms, nor had corresponding powers of command. The ranks were filled for the most part by the transfer of men of good character from regiments after a certain term of service, usually two years. Each man transferred had to pass a probationary period of three months in a military hospital, before he was permanently appointed to the corps.

In 1858 a Royal Commission under the presidency of the Right Honorable Sidney Herbert was ordered to report on the regulations affecting the sanitary condition of the army, the organization of military hospitals, and the treatment of the sick and wounded. The report of this commission was of the greatest importance to the medical service, leading to improvements in its efficiency and in the status and position of its officers. Through its means, two fundamental changes were introduced—the remodeling of the department, and the organization of a practical Army Medical School. From this period a great tendency to improve the condition of military medical officers became manifest.

The regimental system (or that in which medical officers were an integral part of the regiment), which had existed for so long a period and was still in force, though it had been of great service in the past, was found to be incompatible with the development of the army medical service. In consequence, in March, 1873, a royal warrant, devised by Mr. Cardwell, then Secretary of State for War, abolished the regimental system and placed all medical officers in one staff or department. Up to 1889, the officers of the army medical staff doing duty with the Household Troops were purely regimental officers, but subsequent to that date no officers have been gazetted to the junior ranks; these being filled by medical staff officers attached for duty; the surgeon majors of regiments are, however, still regimental officers, and as vacancies occur officers of the general list will be gazetted to fill them.

This was followed by a second warrant, of the same date, which

organized the Army Hospital Corps for extended duties in connection with hospital service. Two new ranks of officers were created, viz.: "Captain of Orderlies" and "Lieutenant of Orderlies," while the rank of Apothecary to the forces, dating from 1854, was abolished. In the same year it was directed that military hospitals should be organized and administered either as general hospitals, station hospitals, or field hospitals. Regimental hospitals ceased to exist.

In 1877, authority was given to medical officers to command the officers, non-commissioned officers and men of the Army Hospital Corps, and also all patients in military hospitals, as well as soldiers attached to them for duty. In 1881, the Captains and Lieutenant of Orderlies were gazetted as Quartermasters, Army Hospital Corps, and placed on the same footing as regards pay and retiring allowances as Quartermasters of Infantry.

In 1883, a committee, under the presidency of Lord Morley, was appointed by the Secretary of State for War, to inquire into the organization of the Army Hospital Corps, hospital management, and nursing in the field. Several valuable recommendations were made by it, among which were: Undivided control of hospitals to be vested in medical officers; the medical service of the Household Troops to be assimilated with that of the Army; opportunity to be afforded for the practice, in peace, in the use of war equipment, both as regards bearer companies and field hospitals; and the assimilation of the Army Hospital Corps with the Army Medical Department; both of which were to wear the same uniform.

In 1884, officers of the Army Medical Department and the quartermasters of the Army Hospital Corps, were designated "The Medical Staff" and the warrant officers, non-commissioned officers and men of the Army Hospital Corps were designated "The Medical Staff Corps." This organization still obtains.

On the Army Service Corps now devolves the duty of supplying transport for the medical department; the transport officer of the Army Service Corps taking orders from the medical officer commanding the bearer company or field hospital to which the transport is attached.

In 1889, a committee, under the Earl of Camperdown, was appointed to inquire into the pay, status and conditions of service of the medical officers of the army and navy; and in 1891 there was promulgated a royal warrant altering, in some respects, the designation of the department ranks of the medical staff, and providing for the grant of sick leave to officers of the medical staff, on the same conditions as those which are applicable to regimental officers. By this warrant the substantive titles of the officers of the medical staff were laid down as follows: Surgeon-Major-General, Surgeon-Colonel, Brigade-Surgeon-Lieutenant-Colonel, Surgeon-Lieutenant-Colonel, Surgeon-Major, Surgeon-Captain, Surgeon-Lieutenant. These titles were to carry precedence and other advantages attaching to the rank indicated by the military portion of the title, but with limited command.

The army rank conferred on medical officers facilitates the performance of the duties of command and discipline now imposed on them. Where the military command of soldiers is involved, the possession of a military title is convenient for common parlance, and it enhances the officers' authority.

ORGANIZATION.

The officers of the Army Medical Staff comprise a Director-General, and a fixed establishment of administrative officers, consisting of 10 surgeon-major-generals, 24 surgeon-colonels, and 50 brigade-surgeon-lieutenant-colonels, who, though executive officers, are available for administrative duties. There is no fixed establishment for each of the remaining ranks of executive officers, but the total number averages 763. There are also 35 quartermasters. The Medical Staff Corps consists of 36 warrant officers, 336 staff sergeants and sergeants, and 2,030 rank and file. The Director-General is, under the commander-in-chief, the responsible head of the department, and is charged with the administration and command of the Army Medical Staff and Medical Staff Corps; also of the Militia Medical Staff and Corps, the militia reserve of the Medical Staff Corps, and the medical establishment of the army, including the army medical reserve of officers, besides the volunteer staff and corps, and the

nursing service. The surgeon-major-generals, and surgeon-colonels act as principal medical officers in charge of the medical administration of districts and commands. In certain smaller districts, brigade-surgeon-lieutenant-colonels perform these duties as senior medical officers. The remaining body of officers perform the executive duties at all stations at home and abroad. The warrant and non-commissioned officers and men of the medical staff corps are under the command of the officers of the Army Medical Staff.

TERMS OF SERVICE, TRANSPORT, ARMS, INSPECTION AND MOBILIZATION.

Officers.

The full conditions of service in the Army Medical Staff are laid down in the royal warrant for pay and promotion; but briefly stated, they are as follows: An officer, after three years full-pay service as Surgeon-Lieutenant, if favorably reported on, is promoted to the rank of Surgeon-Captain, and after twelve years full-pay service, including at least three years abroad, and having passed a satisfactory examination, is promoted to the rank of Surgeon-Major. A Surgeon-Major is promoted, if recommended, to Surgeon-Lieutenant-Colonel, after twelve years full-pay service. All promotions to the fixed establishments of the higher ranks are governed by seniority, tempered by selection with due regard to ability and merit. The regulations as to the full pay, half pay and retired pay of the different ranks are laid down in the royal warrant for pay, etc.

Enlistments.

A recruit, desiring to enlist in the Medical Staff Corps, must be able to read and write, and must produce a certificate of good character from his previous employer. He must be from 18 to 28 years of age, from 5 ft. 3 in. to 5 ft. 5 in. in height, and of minimum chest measurement and weight, of 33 inches and 115 lbs. respectively. Enlistment is for seven years army, and five years reserve service, or three years army and nine years reserve service, at the option of the recruit; which periods of service will be respectively converted into eight years army and four years reserve service, or four years army and eight years reserve service, if the period of army

service expires while the man is serving abroad. The regulations as to the regimental pay, the additional corps pay which the men ordinarily receive, and the extra-duty pay given them under special circumstances, are laid down in the royal warrant for pay, etc.

Transport.

The transport for all hospital establishments is carried out by the Army Service Corps.

Arms.

The arms of the Medical Staff Corps are a short sword bayonet. The equipment is as for infantry, but with the valise pattern of 1882. All recruits go through a special course of musketry. On field service, the Medical Staff Corps is supplied with arms and ammunition in the usual manner. It should be added here, that if England were fighting a nation under the terms of the Geneva Convention, the Medical Staff Corps would be strictly neutral, and would not be in possession of arms or ammunition.

Inspection.

The inspection of the Medical Staff Corps is carried out half-yearly by the principal medical officer of the district. He inspects and receives reports of the officers of the Army Medical Staff serving under him, and satisfies himself that they are efficient in all the details of their duty. He also inspects the hospital, and examines into the interior economy. He renders confidential reports on the officers serving in his district, annually, through the general officer commanding, after inquiring into their military and professional efficiency.

Mobilization.

The general idea, as far as medical arrangements are concerned, is that there should be preparation made for the reception of 20,000 wounded in London (the scheme is already prepared in detail), and that medical officers and men for the various units, field hospitals, and bearer companies, for three mobile army corps, should be detailed and ready for immediate mobilization. This has been done, and tables are now issued showing in detail how the arrangements are to be carried out. In addition, each general officer commanding

a district is directed to prepare a scheme of defence for such district, with the forces and equipment, civil and military, at his disposal. All arrangements are made with a lighter scale of equipment than for foreign service, it being assumed that the campaign would be very brief, and no tents or heavy field equipment are arranged for. A pamphlet will shortly be issued with army orders giving "Instructions for the organization and distribution of the Army Medical Staff, Medical Staff Corps, and Militia and Volunteer Medical Staff Corps, on mobilization for Home Defense."

AUXILIARIES AND RESERVES.

There is a body of 1,200 non-commissioned officers and men of the militia reserve, who are annually trained in the duties of the Medical Staff Corps, and by royal warrant, dated 6th June, 1891, the formation of a Militia Medical Staff Corps has been approved. This corps, when raised,* will comprise the ranks of Surgeon-Major, Surgeon-Captain, Surgeon-Lieutenant, Sergeant, Corporal, and private, who are to receive pay and allowances laid down in Regulations for Militia, 1893. Another large and important auxiliary to the Medical Staff Corps is furnished by the Volunteer service. Ever since the commencement of the Volunteer movement, medical officers have been attached to each volunteer corps or battalion; but by Army Circular, Clause 59, of 1886, a royal warrant was published, which provided that with a view to the further development of the medical organization of the Volunteer force, a corps, to be designated the Volunteer Medical Staff Corps, should be formed. This corps comprises the following ranks: Surgeon-Lieutenant-Colonel, Surgeon-Major, Surgeon-Captain, and Surgeon-Lieutenant, quartermaster, first and second class staff sergeants, sergeant-bugler, sergeant, corporal, bugler, private. Like other volunteer corps, the Volunteer Medical Staff Corps has a permanent staff from the regular army, consisting of an adjutant, who is a surgeon-captain of the Army Medical Staff, an acting sergeant-major, and sergeant-instructors, who are non-commissioned officers of the Medical Staff Corps. Originally, the Volunteer Medical Staff Corps con-

*One company is already formed, the Haunts Company Militia Medical Staff Corps.

sisted of only one division company in London; but there are now companies in Edinburgh, Woolwich, Manchester, Maidstone, Leeds, Aberdeen, Norwich, and Glasgow. Since the organization of Volunteer infantry brigades in 1888, a brigade-surgeon has been appointed on the staff of each brigadier-general, who is responsible to the Director-General through the principal medical officer of the district, and has under his orders the regimental surgeons of the several corps forming the brigade. Under this system also brigade bearer companies have been formed. These are composed of men taken from the fighting ranks; no provision having as yet been made for volunteers to qualify as efficient otherwise than through the usual training and drill with their corps; and they are only trained in ambulance work as secondary duty.

By royal warrant dated 18th February, 1888, an Army Medical Reserve of officers was established. In the Secretary of State's instructions on the warrant, it was laid down that medical officers of the militia, yeomanry, and volunteers, on electing to join this reserve, should undertake to perform any duties at home at the rates of remuneration laid down for civilian medical practitioners in the royal warrant for pay, and that officers of the army medical reserve would have a prior claim to employment in the district in which they reside, to other medical officers of the auxiliary forces or to civilian practitioners. The medical officers on the retired list, who are liable to be recalled to service, are shown in the quarterly official army list; as is also the army medical reserve of officers of the ranks, from surgeon-lieutenant to surgeon-lieutenant-colonel. Promotion is given regularly according to length of service on fulfillment of the prescribed rules.

Candidates for service in the army medical staff on the west coast of Africa enter under the same qualifications as for the army medical department generally, except that they may be admitted at a later age. They are required to complete three years service on the coast, after which they will be eligible for general service. For each year's service on the coast, an officer is entitled to a year's leave at home on full pay, and each year or portion of the same served on the coast reckons double towards volunteer retirement on retired pay.

THE NURSING SERVICE.

The nursing service is divided into three grades:—lady superintendents, senior nursing sisters (or acting lady superintendents), nursing sisters. A candidate for the appointment of nursing sister must not be under twenty-five or over thirty-five years of age, and must produce an extract from the register of her birth, or, in default, a declaration made before a magistrate by one of her parents or guardians, giving her exact age. She must also produce a recommendation from some person of social position, not a member of her own family, as to her standing in society, and also some testimony as to her possessing the tact, temper, and ability qualifying her for appointment. She must further sign a declaration showing whether she is single, married, or a widow, and whether a member of any sisterhood or society. She must produce a certificate of health and also evidences of having had at least three years preliminary training and service combined, in an approved civil hospital, where adult male patients receive medical and surgical treatment, and in which a staff of nursing sisters, under a matron, is maintained. She must further produce certificates of efficiency in medical and surgical nursing, from the medical officers under whom she has served. Nursing sisters are retired after the age of sixty years, on a pension. If disabled in the service before that age, the amount of pension or gratuity is regulated by their length of service. They are rationed and allowed a uniform free of all expense, and also certain allowances for washing and attendance. They are placed under a strict discipline, their duties being very fully defined, and the lady superintendent, or the acting lady superintendent, is responsible to the principal medical officer for their work being properly carried on. Nursing sisters serve abroad, and are detailed for foreign service by the Director General, as far as the exigencies of the service will permit, according to a roster.

PURPOSE AND DUTIES IN PEACE.

The existence of a body of military medical officers, and of a corps of trained orderlies and sick attendants, is essentially necessary. It is more particularly so to the British Army, owing to the varied conditions under which that army is called upon to serve.

The duties of the medical staff comprise: The general treatment of the sick, officers, men, women, and children. The careful observation and regulation of the sanitary surroundings of the soldiers, bearing in mind the various conditions of service in climates of widely varying character. The prevention as well as the treatment of disease. The examination and passing of recruits for the Army. The invaliding of men who are physically unfit for further service. The management and control of the various classes of hospitals, general hospitals, station hospitals, hospitals on board ships, lunatic hospitals, hospitals for women and children. The supervision and control of all officers and men, both patients and those doing duty in these various hospitals. The command, discipline, and interior economy of the Medical Staff Corps.

With reference to sub-heading No. 2 above (sanitation), in these days of progress and improved education, a knowledge of sanitary science and of the ordinary rules for the preservation of health is almost universal among all classes. The duty, consequently, of a medical officer in advising his general, or other commanding officer, upon sanitary questions, is much lightened and facilitated. Old prejudices are disappearing; there is less friction; and both commanding and medical officers understand each other on these points, and work together for the common good of the soldiers. It is the practice to place medical officers in immediate charge of the troops in certain sections of a garrison. By this means, if not changed too frequently, they become acquainted with the localities and with the several commanding officers, between whom and these medical officers it is very desirable there should be frequent periodical communication, whereby the interests of the service are best compassed.

Junior medical officers are not placed in actual charge of regiments on home service, though in India this is sometimes done. The adoption of the station hospital system has rendered the old system in this respect unnecessary, though it is undoubtedly a fact that it would be most desirable for young officers to be attached regimentally for a fixed period, and there gain an insight into regimental ways, and the inner working of the soldier's daily life, as

a good preparation for the responsible duties referred to in the previous paragraph.

General hospitals are organized for the reception of invalids from India and abroad, the sick of corps at stations, and all entitled or especially authorized to be admitted into military hospitals. There is also separate and special accommodation for sick and wounded officers. The general hospitals in England are:—The Royal Victoria Hospital, at Netley, and the Herbert Hospital, at Woolwich. Station hospitals are established for the reception and treatment of sick from all corps in garrison, auxiliary troops when embodied, and all other persons who may be admitted under special sanction. Each is commanded by a medical officer appointed by the Director General, usually a surgeon-lieutenant-colonel, or a surgeon-major, subject to the general officer or other officer in command of the troops at the station. An establishment of officers of the medical staff, and warrant officers, non-commissioned officers and men of the medical staff corps, is provided for each hospital, according to its requirements.

Station hospitals are equipped according to schedules laid down. Under certain conditions they are non-dieted.* Non-dieted hospitals are met with in some barracks where the station hospital is some distance off. They are called "auxiliary" or "convalescent" hospitals, and contain a few beds for cases of accident, or the like, and an inspection room, where the medical officers in local charge can examine soldiers, or others who report themselves sick. Hospitals on board ships are organized and conducted similarly to non-dieted station hospitals, the equipment in each case being placed on board by the Admiralty. Lunatic hospitals are only established in connection with general hospitals, and are administered under similar regulations. They are subject to the authority of the Commissioners of Lunacy. Hospitals for soldiers' wives and children are organized and administered as station hospitals. These special hospitals are much assisted by the kindly interest taken in them by officers' wives and other philanthropic persons. They

*In dieted hospitals the patients are fed according to a special scale of diet.

are not wholly maintained by government, and special funds for their support are raised by voluntary contributions, and valuable assistance given, both in money and kind.

MEDICAL DUTIES IN WAR.

In time of war, the duties of medical officers and the medical staff corps are as a rule of an exceptionally arduous and responsible nature. A large proportion of the warfare in which British troops are engaged is in tropical and unhealthy countries, against savage and war-like nations, to whom the Geneva Convention and the courtesies of modern warfare are unknown. Consequently, sick and wounded men cannot in case of emergency or retreat be left to the care of the enemy, but must be carefully guarded and treated, and removed to a place of safety, as if abandoned it would only be to torture and death. The arrangements for medical assistance with an army in the field are:—A medical officer with each unit, regiment, body of artillery, corps, or staff. This officer has at his disposal the trained regimental stretcher bearers, two per company or troop. To each brigade a bearer company is attached and there is one field hospital. To each division an additional field hospital is allowed. For an Army Corps the medical establishment consists of ten field hospitals and six bearer companies, exclusive of the regimental aid. In addition to this, a certain number of officers of the medical staff are utilized for staff purposes, and are shown in the lists of field establishments.

With a cavalry division, which is considered separately from the army corps, there are two bearer companies and three field hospitals.

The entire medical service is under the command of a Surgeon-Major-General, who is included with the staff of the General commanding the line of communications, and subject to the authority of the General commanding-in-chief. When a soldier falls wounded in the fighting line, he is reached and attended to as quickly as possible by the medical officers attached to the regiment or corps. He is carried or assisted to the collecting station, and handed over to the bearer company. The collecting station is the advanced

post of pack animal ambulance transport and the various forms of wheeled carriage. It is usually in charge of a non-commissioned officer who has a small supply of restoratives for the more seriously injured. To this point all the wounded are conveyed, and are placed on the transport vehicles, to be passed on to the dressing station, about 1,500 to 2,000 yards from the fighting line. The dressing station is specially adapted for relieving the most seriously wounded, restoring those who are exhausted, and for performing the necessary operations. It is provided with a tent and medical and surgical panniers. The staff consists of two or three officers of the medical staff, according to the regiments, and ten non-commissioned officers and men, including a cook. The transport and attendance on the wounded from the fighting line, through these two posts of succor, is performed by the bearer company. These two stages comprise the "First Line of Assistance." From the dressing station the wounded are passed, by road or railway to the field hospital, which is placed in some suitable position beyond the range of fire, or under cover from it. There is here provision for men to remain two or three days if necessary, and they may be either discharged to duty again or passed to the base hospital along the line of communication. The duration of the transit depends upon the distance of the fighting line from the base, and the nature of the transport used. This forms the "Second Line of Assistance." When the distance is great, hospitals on the line of communication are formed, and the journey of the sick and wounded is made by stages to the base. The base hospital is formed usually at or near the post of embarkation for England, and consists of a large staff with every possible appliance for care and treatment of the wounded. This forms the "Third Line of Assistance." Invaliding boards are held regularly at the base hospital, and the sick and wounded are either returned to the front or sent home; and with the object of meeting the requirements, hospital ships are equipped, so that the soldier lacks nothing to give him the fairest chance of recovering from the effects of climate or injuries. The last stage is disembarkation in England, and transfer to the Royal Victoria Hospital at Netley, or some other hospital.

One most important fact must be noted, and that is the much greater distance now, in contrast to recent days, between the fighting line and the dressing station. The carriage of a man of 10 to 12 stone, these distances, over rough and uneven ground, requires bearers of good physique. The introduction of smokeless powder, and the increased velocity and range of rifle fire, will doubtless greatly modify the arrangements for the removal of wounded men from the field. Various theories have been propounded; but so much depends on the tactics and methods of attack that may be found practical under the new conditions, that only practical experience is likely to show what will be the best system for ambulance work.

V.

*THE SANITARY ORGANIZATION OF THE
UNITED STATES ARMY.**

Previous to the outbreak of the War of Secession, the regular army numbered one thousand, one hundred and seventeen (1,117) commissioned officers, and eleven thousand nine hundred and seven (11,907) enlisted men.

The Medical Department was composed of one Surgeon General, with the rank of Colonel, thirty Surgeons with the rank of Major, and eighty-four Assistant Surgeons holding for the first five years the rank of First Lieutenant, and subsequent to that period, until promotion to Surgeon, the rank of Captain.

The officers of the Medical Department formed a portion of the General Staff of the army; were not permanently attached to any regiment or command, but were subject to duty wherever their services were needed. Experience has demonstrated this system to be the best for the necessities of an army widely scattered over an immense area of territory, serving in commands of less than regimental strength, while it possessed the advantage of increasing the efficiency and value of the medical force in a professional point of view.

*Compiled from the Medical and Surgical History of the War of the Rebellion and other sources.

At the beginning of hostilities, in 1861, large forces of State troops, or militia, responded to the several proclamations of the President calling for aid in suppressing the rebellion. Each regiment was provided with a Surgeon and an Assistant Surgeon, commissioned by the State in which the troops had been enlisted. These officers were borne on the muster-rolls and permanently attached to the regimental organization, being seldom detached except for urgent reasons.

During the early military operations, the administrative duties pertaining to the Medical Department were performed by officers of the regular medical staff, detailed for the purpose, or by volunteer Surgeons appointed as Medical Directors of Divisions, as allowed by the President's proclamation of May 3d, 1861.

On the 22d of July, 1861, Congress passed an act authorizing the President to raise a force of volunteers, not exceeding 500,000, and prescribing the organization of this levy into divisions of three or more brigades, and that "each brigade shall be composed of five or more regiments, and shall have one Brigadier General, two Aids-de-Camp, one Assistant Adjutant General with the rank of Captain; one Surgeon; one Assistant Quartermaster, and one Commissary of Subsistence." The Surgeons authorized by this act were known as Brigade Surgeons, and were borne as such on the official army registers of September, 1861, and January, 1862. They held the rank of Major.

The duties, prerogatives, and responsibilities of Brigade Surgeons being somewhat vaguely defined, the following was passed by Congress on July 2d, 1862: "From and after the passage of this act, Brigade Surgeons shall be known and designated as Surgeons of Volunteers, and shall be attached to the general medical staff under the direction of the Surgeon General; and hereafter such appointments for the medical service of the army shall be appointed Surgeons of Volunteers."

The Brigade Surgeons or Surgeons of Volunteers, as they were henceforth called, were assimilated to those of the regular staff, holding equal rank with the latter under commissions conferred by the President and confirmed by the Senate. They became eligible to

all the duties and prerogatives pertaining to the medical officers of the army, whether in the field as Directors of armies, corps, or departments, or in charge of hospitals, etc. From time to time, by acts of Congress, additions were made to the regular and volunteer corps, and such changes effected as were necessarily demanded. The act of April 16th, 1862, was one of the most important of these acts, wherein the rank of Brigadier General was conferred upon the Surgeon General. Provisions were also made in this act for an Assistant Surgeon General, and a Medical Inspector General, both with the rank, pay and emoluments of Colonel of Cavalry, and for eight Medical Inspectors, with the rank, pay, and emoluments of Lieutenant Colonel of Cavalry; also for Medical Purveyors and Medical Cadets.

The text of the law is here inserted:

An act to reorganize and increase the efficiency of the Medical Department of the Army.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress Assembled, That there shall be added to the present medical corps of the army, ten Surgeons and ten Assistant Surgeons, to be promoted and appointed under existing laws; twenty medical cadets, and as many hospital Stewards as the Surgeon General may consider necessary for the public service, and that their pay and that of all hospital stewards in the volunteer, as well as the regular service, shall be thirty dollars per month, to be computed from the passage of this act. And all medical cadets in the service shall, in addition to their pay, receive one ration per day, either in kind or commutation.

Sec. 2. And be it further enacted, That the Surgeon General to be appointed under this act, shall have the rank, pay, and emoluments of a Brigadier General. There shall be one Assistant Surgeon General, and one Medical Inspector General of Hospitals, each with the rank, pay, and emoluments of a Colonel of Cavalry, and the Medical Inspector General shall have, under the direction of the Surgeon General, the supervision of all that relates to the sanitary condition of the army, whether in transports, quarters, or camps, and of the

hygiene, police, and discipline and efficiency of field and general hospitals under such regulations as may hereafter be established.

Sec. 3. And be it further enacted, That there shall be eight Medical Inspectors, with the rank, pay, and emoluments each of a Lieutenant Colonel of Cavalry, and who shall be charged with the duty of inspecting the sanitary condition of transports, quarters, and camps, of field and general hospitals, and who shall report to the Medical Inspector General under such regulations as may hereafter be established, all circumstances relating to the sanitary condition and wants of troops and of hospitals, and to the skill, efficiency, and good conduct of the officers and attendants connected with the Medical Department.

Sec. 4. And be it further enacted, That the Surgeon General, the Assistant Surgeon General, Medical Inspector General, and medical inspectors, shall, immediately after the passage of this act, be appointed by the President, by and with the advice and consent of the Senate, by selection from the medical corps of the army, or from the surgeons in the volunteer service, without regard to their rank when so selected, but with sole regard to qualifications.

Sec. 5. And be it further enacted, That medical purveyors shall be charged, under the direction of the Surgeon General, with the selection and purchase of all medical supplies, including new standard preparations, and of all books, instruments, hospital stores, furniture and other articles required for the sick and wounded of the army. In all cases of emergency they may provide such additional accommodations for the sick and wounded of the army, and may transport such medical supplies, as circumstances may render necessary, under such regulations as may hereafter be established, and shall make prompt and immediate issues upon all special requisitions made upon them under such circumstances by medical officers; and the special requisition shall consist simply of a list of the articles required, the quantities required, dated and signed by the medical officers requiring them.

Sec. 6. And be it further enacted, That whenever the Inspector General or any of the medical inspectors, shall report an officer of the medical corps as disqualified by age, or otherwise for promotion

to a higher grade, or unfitted for the performance of his professional duties, he shall be reported by the Surgeon General for examination to a medical board as provided by the seventeenth section of the act approved August third, 1861.

Sec. 7. And be it further enacted, That the provisions of this act shall continue and be in force during the existence of the present rebellion and no longer. Provided, however, that when this act shall expire, all officers who shall have been promoted from the medical staff of the army, under this act, shall retain their respective rank in the army, with such promotion as they would have been entitled to.

Approved April 16, 1862.

Besides the medical officers of the regular and volunteer staff, and the medical officers of regiments, there was a class designated as Acting Assistant Surgeons, who were private physicians, uncommissioned, serving under contract to do duty with the forces in the field or in general hospitals. This class was very large, and embraced in its number some of the most eminent surgeons and physicians of the country. The Medical Cadets were generally young men, students of medicine, who were assigned to duty in general hospitals, as dressers and assistants.

The Medical Department was still further increased by a number of Hospital Stewards, who were enlisted as needed, and who performed the duties of druggists, clerks, and storekeepers.

During the years of the war the organization of the Regular staff had been increased so as to number one Surgeon General, one Assistant Surgeon General, one Medical Inspector General, sixteen Medical Inspectors, and one hundred and seventy Surgeons and Assistant Surgeons; there had been appointed five hundred and forty-seven (547) Surgeons and Assistant Surgeons of Volunteers; there were mustered into service between April, 1861 and the close of the war, two thousand one hundred and nine (2,109) regimental Surgeons, three thousand eight hundred and eighty-two (3,882) regimental Assistant Surgeons. During the same period there were employed eighty-five (85) Acting Staff Surgeons and five thousand five hundred and thirty-two Acting Assistant Surgeons.

To the fidelity and efficiency of this vast body of professional men the Surgeon General, in his annual report of 1865, bears the following well-deserved tribute: "I desire to bear testimony to the ability, courage, and zeal manifested throughout the war by the officers of the Medical Department, under all circumstances and upon all occasions. With hardly an exception, they have been actuated by the highest motives of national and professional pride, and the number who have been killed or wounded bears honorable testimony to their devotion and duty on the field of battle."

The following record of casualties of the Regular and Volunteer Staff during the war shows well for the honor of those who are erroneously supposed to escape the dangers and chances of war: "Thirty-two (32) were killed in battle, or by guerillas or partizans, and nine (9) by accidents; eighty-three (83) were wounded in action; of whom ten (10) died; four (4) died in rebel prisons, seven (7) of yellow fever, three (3) of cholera, and two hundred and seventy-one (271) of other diseases, most of which were incidental to camp life or the result of exposure in the field." Of the amount of labor performed by the medical staff during the war some idea may be obtained when it is stated that over six million cases of wounds and diseases occurred among the troops. "The cost of maintaining the medical department formed no small portion of the total expenses of the war, and it is a matter of just pride that it can be said that the medical disbursing officers performed their duties faithfully and honestly, and that the immense quantities of medical supplies distributed all over the country were almost without exception properly accounted for. The expenditures on behalf of the Medical Department to the close of each fiscal year, on the 30th of June, from 1861 to 1866 were as follows:—

1861	\$	194,126.77
1862	.....	2,371,113.19
1863	.....	11,594,650.35
1864	.....	11,025,791.33
1865	.....	19,328,499.23
1866	.....	2,837,801.37

making a total of \$17,351,982.24, expended during the war (exclusive of salaries of commissioned officers) for the benefit of the sick and wounded soldiers of the nation."

After the organization of the forces raised for the suppression of the rebellion was perfected, the medical service in the field was based upon an independent hospital and ambulance establishment for each division of three brigades. The personnel of the division hospital consisted of a Surgeon in charge, with an Assistant Surgeon as executive officer, and a second Assistant Surgeon as recorder, an operating staff of three surgeons aided by three Assistant Surgeons, and the requisite number of nurses and attendants. The division ambulance train was commanded by a First Lieutenant of the line, assisted by a Second Lieutenant for each brigade. The enlisted men detailed for ambulance duty were a sergeant for each regiment, three privates for each ambulance, and one private for each wagon. The ambulance train consisted of from one to three ambulances for each regiment, squadron or battery, a medicine wagon for each brigade, and two or more supply wagons. The hospital and ambulance train were under the control of the Surgeon in Chief of the Division. The division hospitals were usually located just out of range of artillery fire. Sometimes three or more division hospitals were consolidated under the orders of a Corps Medical Director, who was assisted by his Medical Inspector, Quartermaster, Commissary, and chief ambulance officer.

The medical officers not employed at field hospitals accompanied their regiments and established temporary depots as near as practicable to the line of battle.

As soon as possible after every engagement, the wounded were transferred from the division or corps hospitals, to the base or general hospitals, which at one time numbered 205; these were under the charge and command of the Regular or Volunteer Staff, assisted by Acting Assistant Surgeons, Medical Cadets, and officers of the 2d battalion of the Veteran Reserve Corps.

AMBULANCE CORPS.

The necessity for a drilled and instructed corps for the transportation of wounded from the field is apparent to every one who

will consider the subject. The importance of having the wounded rapidly removed from the scene of strife must be conceded, not only on the score of humanity, but also as a military necessity. Without a detachment whose duty it is to attend to this service, the natural impulse of sympathy, will draw men from the ranks to assist their fallen comrades, while the pretext is a temptation to the faint-hearted to shirk the perils of their position. Moreover, the courage of troops under fire would be sustained if they were assured that reliable men would be ready to bear them rapidly from the vicissitudes of a conflict and to tender them early assistance. No organized ambulance corps existed in the army at the beginning of the war, but the necessity of such an organization, under the control of the Medical Department, was early recognized by the medical officers, and already in April, 1862, Medical Director Tripler, of the Army of the Potomac, called attention to the absolute necessity of having an experienced Quartermaster, and assistant commissary of subsistence, attached to the command of the Chief Medical Officer of an army in the field: "I find it impossible to secure either transportation or subsistence for the men thrown upon my hands, without tedious delays and much unnecessary suffering. Time, which is so valuable to me now, is taken up and wasted in endeavors, too often unsuccessful, to get together ambulances and wagons, to have these trains properly and economically conducted, to have boats prepared and in position, to procure buildings for hospitals, to get subsistence for the sick and wounded, and, in short, doing the duty assigned to quartermasters and subsistence officers. It seems to me that to bring this evil to the notice of the Secretary of War, will be sufficient to cause its instant remedy; at all events, I protest beforehand against the medical department being held responsible for evils they have no possible means of obviating. My experience in this campaign has taught me that without an executive officer of these two important departments under my command, more time is lost in negotiating through second and third parties, with an even chance of not getting at all what is wanted, and a certainty of not getting it in time, than would be required, in procuring what is

necessary and having it in the right place if these officers were placed at my disposal."

On August 21, 1862, Surgeon General W. A. Hammond, U. S. Army, in a letter to the Secretary of War, urged the necessity for such a corps:—

SURGEON GENERAL'S OFFICE, }
Washington, August 21, '62. }

HONORABLE EDWIN M. STANTON,

Secretary of War.

Sir:—In accordance with your verbal permission, I have the honor to submit to you the inclosed project for an Hospital Corps, and to ask your favorable consideration for the same. The plan is merely submitted as a basis on which the corps can be organized; much will remain to be done by regulations, and I propose, should you approve the inclosed outline, to ask for a board of medical officers to perfect the organization. I have not considered it necessary to enter into details; the first thing essential is to obtain your sanction to the organization of such a corps. The need for it is most urgent. In no battle yet have the wounded been properly looked after; men under pretence of carrying them off the field leave the ranks and seldom return to their proper duties. The adoption of this plan would do away with the necessity of taking men from the line of the army to perform the duties of nurses, cooks and attendants, and thus return sixteen thousand men to duty in the ranks. In view of these facts, and many others which could be adduced, I respectfully ask your approval of the inclosed project.

I am, sir, very respectfully,

Your obedient servant,

(Signed.)

WILLIAM A. HAMMOND,
Surgeon General.

To this the following answer was received:—

WAR DEPARTMENT, }
Washington City, D. C., August 29, '62. }

Sir:—The Secretary of War directs me to acknowledge the receipt of your communication of the 21st instant, submitting a project for a Hospital Corps, and to inform you that the subject was

referred to the General-in-Chief, whose views, adverse to the project, are expressed in the following words: "Our army trains are already much too large and very seriously impede the movements of our troops in the field. The enemy have great advantage over us in this respect. To organize such a medical force as is here proposed would, besides involving enormous expenses, greatly increase this evil. Moreover, the presence of non-combatants on, or near the field of battle, is always detrimental, as most panics and stampedes originate with them. Medical soldiers would not obviate the necessity of sending fighting soldiers from their ranks with their wounded, for the former would seldom be near enough to the enemy to perform that duty. The soldier can be very much relieved by hiring cooks, nurses, and attendants in hospitals, whenever the circumstances will permit; but I can see no advantage in having them enlisted for that special purpose. All persons so employed are, by law, subject to Army Regulations. I regard this project as one calculated to increase the expenses and immobility of our army by adding to it a large corps of non-combatants, without any corresponding advantages. I therefore report against its adoption."

(Signed.)

P. H. WATSON,

Ass't. Sec'y. of War.

Surgeon General, Washington, D. C.

A second appeal was made to the Secretary of War on September 7, 1862:

SURGEON GENERAL'S OFFICE,
Washington, D. C., Sept. 7, 1862.)

Sir:—I have the honor to ask your attention to the frightful state of disorder existing in the arrangements for removing the wounded from the field of battle. The scarcity of ambulances, the want of organization, the drunkenness and incompetency of the drivers, the total absence of ambulance attendants, are now working their legitimate results, results which I feel I have no right to keep from the knowledge of the Department. The whole system should be under the charge of the Medical Department; an ambulance corps should be organized and set in instant operation. I have already

laid before you a plan for such an organization, which I think covers the whole ground, but which I am sorry to find, does not meet with the approval of the General-in-Chief. I am not wedded to it. I only ask that some system may be adopted by which the removal of the sick from the field of battle, may be speedily accomplished, and the suffering to which they are now subjected, to be, in future, as far as possible, avoided. Up to this date, six hundred wounded still remain on the battle-field in consequence of an insufficiency of ambulances, and a want of a proper system for regulating their removal, in the Army of Virginia. Many have died of starvation, many more will die in consequence of exhaustion, and all have endured torments which might have been avoided. I ask, sir, that you will give me your aid in this matter; that you will interpose to prevent a recurrence of such consequences as have followed the recent battle, consequences which will inevitably ensue on the next important engagement, if something is not done to obviate them.

I am, sir, very respectfully,

Your obedient servant,

(Signed.)

WILLIAM A. HAMMOND.

Surgeon General, U. S. A.

Honorable E. M. Stanton, Secretary of War.

This also was referred to the General-in-Chief, and returned endorsed as follows:

HEADQUARTERS OF THE ARMY.)

Washington, Sept. 15, 1862.)

"I am informed by the Quartermaster General that every effort is being made to supply a large number of ambulances. It is proper to remark, however, that the enemy have provided for their wounded on every battle-field, with not one-half the ambulances and facilities provided for our armies. I do not perceive how the drunkenness and incompetency of drivers are likely to be prevented any more by putting the ambulances exclusively under the direction of the Medical Department. It is the duty of all officers to furnish fatigue parties, properly officered, on the requisition of Medical Officers, for the care and removal of the wounded, and it is the duty of all medical officers to make such requisitions, and if not filled, to report

the neglect. No such neglect has been reported by medical officers on the recent battle-fields. My objection to the proposed organization of a separate non-combatant corps to be attached to the Medical Department, were set forth in my endorsement upon a former letter of the Surgeon General.

(Signed.)

H. W. HALLECK,

General-in-Chief.

Owing to the opposition of the General-in-Chief, no further steps were taken in this direction at this time. In the mean time the medical officers in the field had been compelled to devise the best means they could for the immediate care of the wounded after battles. At the suggestion of Medical Director Tripler, the following order was issued in the Army of the Potomac, on October 3, 1861, viz.:

HEADQUARTERS ARMY OF THE POTOMAC,)
Washington, Oct. 3, '61. }

GENERAL ORDER NO. 20.

* * * * *

VI. The hospital attendants, to the number of 10 men to the regiment, and the regimental bands, will be assembled under the supervision of the brigade surgeons, and will be drilled one hour each day except Sunday, by regimental medical officers, in setting up and dismantling the hand-stretchers, litters, and ambulances; in handling men carefully; placing them upon the litters and ambulance beds; putting them into the ambulances, taking them out, etc.; carrying men upon the hand-stretchers (observing that the leading bearer steps off with the left foot, and the rear bearer with the right); in short, in everything that can render this service effective and the most comfortable for the wounded who are to be transported.

* * * * *

By command of Major General McClellan.

(Signed.)

S. WILLIAMS,

Assistant Adjutant Gen'l.

Similar plans were adopted in other armies, but the first and most complete ambulance system was that established in August, 1862, at the instance of Surgeon Jonathan Letterman, U. S. A., Medical Director of the Army of the Potomac. The plan is clearly set forth in the accompanying order:

HEADQUARTERS ARMY OF THE POTOMAC, }
Camp near Harrison's Landing, Va., August 2, 1862. }

GENERAL ORDER No. 147.

The following regulations for the organization of the Ambulance Corps and the management of ambulance trains, are published for the information and government of all concerned.

Commanders of Army Corps will see that they are carried into effect without delay.:

1. The Ambulance Corps will be organized on the basis of a captain to each Army Corps as the Commandant of the Ambulance Corps, a 1st lieutenant for a division, a 2d lieutenant for a brigade, and a sergeant for each regiment.

2. The allowance of ambulances and transport carts will be: One transport cart, one 4-horse and two 2-horse ambulances for a regiment; one 2-horse ambulance for each battery of artillery, and two 2-horse ambulances for the headquarters of each Army Corps. Each ambulance will be provided with two stretchers.

3. The privates of the Ambulance Corps will consist of two men and a driver to each ambulance, and one driver to each transport cart.

4. The captain is the commander of all the ambulances, and transport carts in the Army Corps, under the direction of the Medical Director. He will pay special attention to the condition of the ambulances, horses, harness, etc., requiring daily inspections to be made by the commanders of division ambulances, and reports thereof to be made to him by these officers. He will make a personal inspection once a week, of all the ambulances, transport carts, horses, harness, etc., whether they have been used for any other purpose than the transportation of the sick or wounded, and medical supplies; reports of which will be transmitted through the Medical Director of the Army Corps to the Medical Director of the Army every Sunday morning. He will institute a drill in his corps, instructing his men in the most easy and expeditious method of putting men in and taking them out of the ambulances, taking men from the ground, and placing and carrying them on stretchers, observing that the front man steps off with the left foot, and the rear man with the

right, etc. He will be especially careful that the ambulances and transport carts are at all times in order, provided with attendants, drivers, horses, etc., and the keg daily rinsed and filled with fresh water, that he may be able to move at any moment. Previous to, and in time of action, he will receive from the Medical Director of the Army Corps his orders for the distribution of the ambulances, and the points to which he will carry the wounded, using the light two-horse ambulances for bringing men from the field, and the four-horse ones for carrying those already attended to, farther to the rear, if the Medical Director considers it necessary. He will give his personal attention to the removal of the sick and wounded from the field, and to and from the hospitals, going from point to point to ascertain what may be wanted, and to see that his subordinates (for whose conduct he will be responsible) attend to their duties in taking care of the wounded, treating them with gentleness and care, and removing them as quickly as possible to the places pointed out; and that the ambulances reach their destination. He will make a full and detailed report after every action and march, of the operations of the Ambulance Corps.

5. The 1st Lieutenant assigned to the Ambulance Corps of a division will have complete control, under the Commander of the whole Corps and the Medical Director, of all the ambulances, transport carts, ambulance horses, etc., in the division. He will be the Acting Assistant Quartermaster of the Division Ambulance Corps, and will receipt and be responsible for the property belonging to it, and be held responsible for any deficiencies in ambulances, transport carts, horses, harness, etc., pertaining to the Ambulance Corps of the division. He will have a traveling cavalry forge, a blacksmith, and a saddler, who will be under his orders, to enable him to keep his train in order. He will receive a daily inspection report of all the ambulances, horses, etc., under his charge, from the officer in charge of Brigade Ambulance Corps, will see that the subordinates attend strictly to their duties at all times, and will inspect the corps under his charge once a week; a report of which inspection he will transmit to the Commander of the Ambulance Corps.

6. The 2d Lieutenant in command of the ambulances of a

brigade, will be under the immediate orders of the commander of the Ambulance Corps for the division, and have superintendence of the Ambulance Corps for the brigade.

7. The sergeant in charge of the Ambulance Corps for a regiment, will conduct the drills, inspections, etc., under the orders of the Commander of the Brigade Ambulance Corps, and will be particular in enforcing rigidly all orders he may receive from his superior officers. The officers and non-commissioned officers of this corps will be mounted.

8. The detail for this corps will be made with care by Commanders of Army Corps, and no officer or man will be selected for this duty except those known to be active and efficient; and no man will be relieved except by orders from these headquarters. Should any officer or man detailed for this duty be found not fitted for it, representations of the fact will be made by the Medical Director of the Army Corps to the Medical Director of this Army.

9. Two medical officers from the reserve corps of surgeons of each division, and a hospital steward, who will be with the medicine wagon, will be detailed by the Medical Director of the Army Corps to accompany the ambulance train when on the march, the trains of each division being kept together, and will see that the sick and wounded are properly attended to. A medicine wagon will accompany each train.

10. The officers connected with the corps must be with the trains on the march, observing that no one rides in the ambulances without the authority of the medical officers, except in urgent cases; but men must not be allowed to suffer, and the officers will, when the medical officers cannot be found, use a sound discretion in this matter, and be especially careful that the men and drivers are in their proper places. The place for the ambulances is in front of all the wagon trains.

11. When in camp, the ambulances, transport carts, and Ambulance Corps, will be parked with the brigade. They will be used on the requisition of the regimental medical officers, transmitted to the Commander of the Brigade Ambulance Corps, for transporting the

sick to various points, and procuring medical supplies, and for nothing else. The non-commissioned officer in charge will always accompany the ambulances or transport carts when on this or any other duty, and he will be held responsible that they are used for none other than their legitimate purposes. Should any officer infringe upon this order regarding the uses of ambulances, etc., he will be reported by the officer or non-commissioned officer in charge, to the commander of the train, all the particulars being given.

12. The officer in charge of a train will at once remove anything not legitimate, and if there be not room for it in the baggage wagons of the regiment, will leave it on the road. Any attempt by a superior officer to prevent him from doing his duty in this or any other instance he will promptly report to the Medical Director of the Army Corps, who will lay the matter before the commander of that corps. The latter will, at the earliest possible moment, place the officers offending in arrest for trial for disobedience of orders.

13. Good serviceable horses will be used for the ambulances and transport carts, and will not be taken for any other purpose, except by orders from these headquarters.

14. The uniform of this corps is: For privates, a green band two inches broad around the cap; a green half chevron two inches broad on each arm above the elbow, and they are to be armed with revolvers. Non-commissioned officers to wear the same band around the cap as a private, chevrons two inches broad, and green, with the point toward the shoulder, on each arm above the elbow.

15. No person will be allowed to carry from the field any wounded or sick, except this corps.

16. The Commanders of the Ambulance Corps, on being detailed, will report without delay to the Medical Director at these headquarters for instructions. All Division, Brigade, or Regimental Quartermasters having any ambulances, transport carts, ambulance horses or harness, etc., in their possession, will turn them in at once to the Commander of the Division Ambulance Corps.

By command of Major General McClellan.

(Signed.)

S. WILLIAMS,
Assistant Adjutant General.

The advantages accruing from this organization became speedily manifest. At the battle of Antietam, in September, 1862, by the active and energetic exertions of the members of this corps, the disabled of the right wing of the army (there was no ambulance system on the left), were rapidly conveyed from the scene of conflict, to the hospitals in the rear. The train of ambulances plied incessantly between the battle-ground and the field hospital. During the night of the battle, all of the wounded in the widely-extended field were removed to shelter and received the necessary surgical attention. Different members of the corps behaved with the utmost gallantry, passing freely under fire in their search for the fallen, and advancing at times to the extreme verge of the enemy's pickets. All of the wounded having thus been collected at the temporary depots, such as were deemed best able to undergo further transportation were carefully selected. These, during the following two or three days, were then conveyed by the ambulance train to Frederick City, Md., the nearest point of railway connections. At the first battle of Fredericksburg, the results of the persevering endeavors of the Ambulance Corps were not less happy. During the night following the battle, all of the wounded remaining on the ground not absolutely in the hands of the enemy were safely conveyed to the city of Fredricksburg and its neighborhood. When it subsequently became necessary to evacuate the city of Fredricksburg for military reasons, the wounded were again placed upon the train and safely reached the opposite bank of the river. These fortunate results were, however, obtained at the expense of the Ambulance Corps, which experienced the loss of one officer and several privates killed, besides others who were captured during their humane efforts to remove their fallen countrymen.

In the Army of the Tennessee, with the exception of General Sherman's Corps, no system for the formation of an ambulance train, for confining ambulances to their proper use, or for the ready removal of wounded, had existed prior to March, 1863, when Medical Inspector E. P. Vollum, U. S. A., urged upon General Grant the necessity of establishing an ambulance corps. The proposition was

cheerfully entertained, and on March 30, 1863, the following order was issued from the headquarters of the Department of the Tennessee:

HEADQUARTERS DEPARTMENT OF THE TENNESSEE,
Young's Point, La., March 30, '63.]

GENERAL ORDER No. 22.

Army Corps Commanders will at once enforce the following regulations:—

1. All ambulances with the army in the field will be turned in to Division Quartermasters, each division retaining all the ambulances it now has.

2. Division ambulance trains will be formed in charge of one commissioned officer for each division, one non-commissioned officer for each brigade, and one driver and two enlisted men for each ambulance, to be detailed for that purpose, who will be subject to the direction of the Chief Surgeon of the division.

3. The officers in charge of division ambulance trains will have direct military control over all the non-commissioned officers and privates of their respective trains, and will see that the ambulances are only used for conveying sick or wounded, carrying provisions for hospitals when necessary, and other purposes connected with the relief of sick and wounded.

4. In removing sick and wounded the enlisted men detailed to attend ambulances, as above directed, will alone be permitted to accompany them, and that they may be recognized as having been appointed for this purpose, each of them will wear a white badge on the left arm above the elbow, the same to be provided by the Medical Department.

5. Division Quartermasters will be responsible for all public property connected with said division ambulance trains, and will exercise authority over all matters pertaining to the packing and preservation of the same.

6. Army Corps Commanders and Medical Directors of Army Corps, will make such regulations for the removal of wounded and sick as will, in their judgment, best secure the end desired to be attained under this order.

By order of Major General U. S. Grant,
(Signed.)

JOHN A. RAWLINS,
Ass't. Adjutant General.

Actual experience in the field suggested various changes in the original plan adopted in the Army of the Potomac, and on August 22, 1863, Surgeon Letterman laid before the General Commanding revised, and much more detailed regulations, which were published in General Orders No. 85, Headquarters of the Army of the Potomac, Aug. 24, 1863.

The following revised regulations for the organization of the Ambulance Corps and the management of the ambulance trains are published in lieu of Special Orders, No. 147, Headquarters Army of the Potomac, August 2, 1862, for the information and government of all concerned. Commanders of Army Corps will see that they are carried into effect.

1. The Army Corps is the unit of organization for the Ambulance Corps, and the latter will be organized upon the basis of a Captain as the Commandant of the Corps, one 1st Lieutenant for each division, one 2d Lieutenant for each brigade, one sergeant for each regiment.

2. The privates of this corps will consist of two men and one driver to each ambulance and one driver to each medicine wagon.

3. The two-horse ambulances only will be used, and the allowance until further orders to each corps will be upon the basis of three to each regiment of infantry, two to each regiment of cavalry, one to each battery of artillery, to which it will be permanently attached, and two of the headquarters of each Army Corps; and two army wagons to each division. Each ambulance will be provided with two stretchers.

4. The captain is the commander of all the ambulances, medicine, and other wagons in the corps, under the immediate direction of the Medical Director, of the Army Corps to which the Ambulance Corps belongs. He will pay special attention to the condition of the ambulances, wagons, horses, harness, etc., and see that they are at all times in readiness for service, that the officers and men are properly instructed in their duties, and that these duties are performed, and that the regulations of the corps are strictly adhered to by those under his command. He will institute a drill in his corps, instructing his men in the most easy and expeditious method

of putting men in and taking them out of the ambulances, lifting them from the ground, and placing and carrying them on stretchers, in the latter case observing that the front man steps off with the left foot and the rear man with the right, etc.; that in all cases his men treat the sick and wounded with gentleness and care; that the ambulances and wagons are at all times provided with attendants, drivers, horses, etc.; that the vessels for carrying water are constantly kept clean and filled with fresh water; that the ambulances are not used for any other purpose than that for which they are designed and ordered. Previous to the march he will receive from the Medical Director of the Army Corps his orders for the distribution of the ambulances for gathering up the sick, and previous to and in time of action he will receive orders from the same officer where to send his ambulances, and to what points the wounded are to be carried. He will give his personal attention to the removal of the sick and wounded from the field in time of action, going from place to place to ascertain what may be wanted, to see that his subordinates (for whose conduct he will be responsible), attend faithfully to their duties in taking care of the wounded and removing them as quickly as may be found consistent with their safety to the field hospitals, and see that the ambulances reach their destination. After every battle he will make a report, in detail, of the operations of his corps, to the Medical Director of the Army Corps to which he belongs, who will transmit a copy with such remarks as he may deem proper to the Medical Director of this Army. He will give his personal attention to the removal of the sick when they are required to be sent to general hospitals, or to other points as may be ordered. He will make a personal inspection at least once a month of everything pertaining to the Ambulance Corps, a report of which will be made to the Medical Director of the Corps, who will transmit a copy to the Medical Director of this Army. This inspection will be minute and made with care, and will not supersede the constant supervision which he must at all times exercise over his corps. He will also make a weekly report according to the prescribed form to the same officer, who will forward a copy to the Medical Director of this Army.

5. The 1st Lieutenant assigned to the Ambulance Corps for a Division will have complete control, under the Captain of his corps and the Medical Director of the Army Corps, of all the ambulances, medical and other wagons, horses, etc., and men in that portion of the Ambulance Corps. He will be the Acting-Assistant Quartermaster for that portion of the corps, and will receipt for and be responsible for all the property belonging to it, and be held responsible for any deficiency in anything appertaining thereto. He will have a traveling cavalry forge, a blacksmith, and a saddler, who will be under his orders, to enable him to keep his train in order. His supplies will be drawn from the Depot Quartermaster upon requisitions approved by the captain of his corps and the Commander of the Army Corps to which he is attached. He will exercise a constant supervision over his train in every particular, and keep it at all times ready for service. Especially before a battle will he be careful that everything be in order. The responsible duties devolving upon him in time of action render it necessary that he be active and vigilant, and spare no labor in their execution. He will make reports to the captain of the corps upon the form prescribed every Saturday morning.

6. The 2d Lieutenant will have command of the portion of the Ambulance Corps for a brigade, and will be under the immediate orders of the commander of the ambulance for a division, and the injunctions in regard to care and attention and supervision prescribed for the Commander of the division he will exercise in that portion under his command.

7. The sergeant will conduct drills, inspections, etc., under the orders and supervision of the commander of the ambulances for a brigade, be particular in enforcing all orders he may receive from his superior officers, and that the men are attentive to their duties. The officers and non-commissioned officers will be mounted. The non-commissioned officers will be armed with revolvers.

8. Two medical officers and two hospital stewards will be detailed daily by roster by the Surgeon-in-Chief of the Division, to accompany the ambulances for the division when on the march.

whose duties will be to attend to the sick and wounded with the ambulances and see that they are properly cared for. No man will be permitted by any line officer to fall to the rear to ride in the ambulances unless he has written permission from the senior medical officer of his regiment to do so. These passes will be carefully preserved, and at the close of march be transmitted by the senior medical officers with the train, with such remarks as he may deem proper, to the Surgeon-in-Chief of his division. A man who is sick or wounded, who requires to be carried in an ambulance, will not be rejected; should he not have the permission required, the Surgeon of the regiment who has neglected to give it will be reported at the close of the march by the senior Surgeon with the train, to the Surgeon-in-Chief of his division. When on the march, one-half the privates of the ambulance corps will accompany on foot the ambulances to which they belong, to render such assistance as may be required. The remainder will march in the rear of their respective commands, to conduct, under the orders of the medical officers, such men as may be unable to proceed to the ambulances, or who may be incapable of taking proper care of themselves, until the ambulances come up. When the case is of so serious a nature as to require it, the Surgeon of the regiment or his assistant will remain and deliver the man to one of the medical officers with the ambulances. At all other times the privates will be with their respective trains. The medicine wagons will on the march be in their proper places in the rear of the ambulances for each brigade. Upon ordinary marches the ambulances and wagons belonging to the train will follow immediately in the rear of the division to which it is attached. Officers connected with the corps must be with the trains when on the march, observing that no one rides in any of the ambulances except by authority of medical officers. Every necessary facility for taking care of the sick and wounded upon the march will be afforded the medical officers by the officers of the Ambulance Corps.

9. When in camp the ambulances will be parked by division. The regular roll-calls, reveille, retreat, and tattoo will be held, at which at least one commissioned officer will be present and receive

the reports. Stable duty will be at hours fixed by the captain of the corps, and at this time, while the drivers are in attendance upon their animals, the privates will be employed in keeping the ambulances to which they belong in order, keeping the vessels for carrying water filled with fresh water, and in general police duties. Should it become necessary for a regimental medical officer to use one or more ambulances for transporting sick and wounded, he will make a requisition upon the Commander of the Ambulances for a Division, who will comply with the requisition. In all cases when ambulances are used the officers, non-commissioned officers, and men belonging to them will accompany them; should one ambulance only be required, a non-commissioned officer as well as the men belonging to it, will accompany it. The officers of the Ambulance Corps will see that ambulances are not used for any other purpose than that for which they are designed, viz.: the transportation of sick and wounded, and in urgent cases only, of medical supplies. All officers are expressly forbidden to use them, or to require them to be used for any other purposes. When ambulances are required for the transportation of sick or wounded at division or brigade headquarters they will be obtained as they are needed for this purpose from the division train, but no ambulances belonging to this corps will be retained at such headquarters.

10. Good, serviceable horses will be used for the ambulances and medicine wagons, and will not be taken for any other purpose except by orders from these headquarters.

11. The corps will be designated, for sergeants, by a green band 1 1-4 inches broad around the cap, and chevrons of the same material, with the point toward the shoulder, on each arm, above the elbow. For privates, by a band the same as for sergeants around the cap, and a half chevron of the same material on each arm above the elbow.

12. No persons except the proper medical officers or the officers and non-commissioned officers and privates of this corps will be permitted to take or accompany sick or wounded to the rear either on the march or upon the field of battle.

13. No officer or man will be selected for this service except those who are active and efficient, and they will be detailed and relieved by Corps Commanders only.

14. Corps Commanders will see that the foregoing regulations are carried into effect.

By command of Major General Mead.

(Signed.)

S. WILLIAMS,

Ass't. Adjutant Gen'l.

The establishment of a uniform system of ambulance corps in the armies of the United States was not accomplished until the spring of 1864, when Congress passed the following act, which was approved by the President on March 1st, 1864, and promulgated by the Secretary of War in General Orders No. 106, War Department, A. G. O., Washington, D. C., March 16, 1864.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Medical Director, or chief medical officer of each army corps, shall, under the control of the medical director, of the army to which such army corps belongs, have the direction and supervision of all ambulances, medicines and other wagons, horses, mules, harness, and other fixtures appertaining thereto, and of all officers and men who may be detailed or employed to assist him in the management thereof, in the army in which he may be serving.

Sec. 2. And be it further enacted, that the commanding officer of each army corps shall detail officers and enlisted men for service in the ambulance corps of such army corps, upon the following basis, viz.: *One captain, who shall be commandant of said ambulance corps; one first lieutenant for each division in such army corps; one second lieutenant for each brigade in such army corps; one sergeant for each regiment in such army corps; three privates for each ambulance, and one private for each wagon; and the officers and non-commissioned officers of the ambulance corps shall be mounted: Provided,

*The number of men detailed by this law seems barely sufficient to perform the work of ambulance and dressing station orderlies. The only inference is that during the war '61-'65 the bearer work was done by fatigue details from the line of the army.

That the officers, non-commissioned officers, and privates so detailed for each army corps shall be examined by a board of medical officers of such army corps, as to their fitness for such duty; and that such as are found to be not qualified shall be rejected, and others detailed in their stead.

Sec. 3. And be it further enacted, That there shall be allowed and furnished to each army corps, two-horse ambulances, upon the following basis, to wit: three to each regiment of infantry of five hundred men or more; two to each regiment of more than two hundred and less than five hundred men or more; and one to each regiment of infantry of less than two hundred men; two to each regiment of cavalry of five hundred men or more; and one to each regiment of cavalry of less than five hundred men; one to each battery of artillery, to which battery of artillery it shall be permanently attached; to the headquarters of each army corps, two such ambulances; and to each division train of ambulances, two army wagons; and ambulances shall be allowed and furnished to division brigades and commands not attached to any corps, upon the same basis, and each ambulance shall be provided with such number of stretchers and other appliances as shall be prescribed by the Surgeon General; Provided, That the ambulances and wagons herein mentioned shall be furnished, as far as practicable, from the ambulances and wagons now in the service.

Sec. 4. And be it further enacted, That horse and mule litters may be adopted or authorized by the Secretary of War, in lieu of ambulances, when judged necessary, under such rules and regulations as may be prescribed by the medical director of each army corps.

Sec. 5. And be it further enacted, That the captain shall be the commander of all the ambulances, medicine and other wagons in the corps, under the immediate direction of the medical director, or chief medical officer of the army corps to which the ambulance corps belongs. He shall pay special attention to the condition of the ambulances, wagons, horses, mules, harness and other fixtures appertaining thereto, and see that they are at all times in readiness for service; that the officers and men of the ambulance corps are properly instructed in their duties, and that their duties are performed,

and that the regulations which may be prescribed by the Secretary of War, or the Surgeon General, for the government of the ambulance corps, are strictly observed by those under his command. It shall be his duty to institute a drill in his corps, instructing his men in the most easy and expeditious manner of moving the sick and wounded, and to require in all cases, that the sick and wounded shall be treated with gentleness and care, and that the ambulances and wagons are at all times provided with attendants, drivers, horses, mules, and whatever may be necessary for their efficiency; and it shall be his duty also to see that the ambulances are not used for any other purpose than that for which they are designed and ordered. It shall be the duty of the medical director, or chief medical officer, of the army corps, previous to a march, and previous to and in time of action, or whenever it may be necessary to use the ambulances, to issue the proper orders to the captain for the distribution and management of the same, for collecting the sick and wounded, and conveying them to their destination. And it shall be the duty of the captain, faithfully and diligently to execute such orders. And the officers of the ambulance corps, including the medical director shall make such reports, from time to time, as may be required by the Secretary of War, the Surgeon General, the medical director of the army, or the commanding officer of the army corps in which they may be serving; and all reports to higher authority than the commanding officer of the army corps shall be transmitted through the medical director of the army to which such army corps belongs.

Sec. 6. And be it further enacted, That the first lieutenant assigned to the ambulance corps for a division shall have complete control, under the captain of his corps and the medical director of the army corps, of all the ambulances, medicine and other wagons, horses, mules, and men in that portion of the ambulance corps. He shall be the acting assistant quartermaster for that portion of the ambulance corps, and will receipt for and be responsible for all the property belonging to it, and be held responsible for any deficiency in anything appertaining thereto. He shall have a traveling cavalry forge, a blacksmith, and a saddler, who shall be under his orders, to enable him to keep his train in order. He shall have authority

to draw supplies from the depot quartermaster, upon requisition approved by the captain of his corps, the medical director, and the commander of the army corps to which he is attached. It shall be his duty to exercise a constant supervision over his train in every particular, and keep it at all times ready for service.

Sec. 7. And be it further enacted, That the 2d lieutenant shall have command of the portion of the ambulance corps for a brigade, and shall be under the immediate orders of the 1st lieutenant, and he shall exercise a careful supervision over the sergeants and privates assigned to the portion of the ambulance corps for his brigade; and it shall be the duty of the sergeants to conduct drills and inspections of the ambulances, under his orders, of their respective regiments.

Sec. 8. And be it further enacted, That the ambulances in the armies of the United States shall be used only for the transportation of the sick and wounded, and in urgent cases only, for medical supplies, and all persons shall be prohibited from using them, or requiring them to be used, for any other purpose. It shall be the duty of the officers of the ambulance corps to report to the commander of the army corps, any violation of the provisions of this section, or any attempt to violate the same. And any officer who shall use an ambulance, or require it to be used, for any other purpose than as provided in this section, shall, for the first offense, be publicly reprimanded by the commander of the army corps in which he may be serving, and for the second offense, shall be dismissed from the service.

Sec. 9. And be it further enacted, That no person, except the proper medical officers, or the officers, non-commissioned officers, and privates of the ambulance corps, or such persons as may be specially assigned, by competent military authority, to duty with the ambulance corps for the occasion, shall be permitted to take or accompany any sick or wounded men to the rear, either on the march or upon the field of battle.

Sec. 10. And be it further enacted, That the officers, non-commissioned officers, and privates of the ambulance corps shall be designated by such uniform or in such manner as the Secretary of War shall deem proper. Provided, That officers and men may be

relieved from service in said corps and others detailed to the same, subject to the examination provided in the second section of this act, in the discretion of the commanders of the armies in which they may be serving.

Sec. 11. And be it further enacted, That it shall be the duty of the commander of the army corps to transmit to the Adjutant General the names and rank of all officers and enlisted men detailed for service in the ambulance corps of such army corps, stating the organizations from which they may have been so detailed; and, if such officers and men belong to volunteer organizations, the Adjutant General shall thereupon notify the governors of the several States in which such organizations were raised, of their detail for such service; and it shall be the duty of the commander of the army corps to report to the Adjutant General from time to time the conduct and behavior of the officers and enlisted men of the ambulance corps, and the Adjutant General shall forward copies of such reports, so far as they relate to officers and enlisted men of volunteer organizations, to the governors of the States in which such organizations were raised.

Sec. 12. And be it further enacted, That nothing in this act shall be construed to diminish or impair the rightful authority of commanders of armies, army corps, or separate detachments, over the medical and other officers and the non-commissioned officers and privates of their respective commands.

Approved, March 11, 1864.

By the passage of this act, the authority of the Medical Department over the Ambulance Corps was fully established. How effectually, and at the same time, how considerably, the medical officers availed themselves of the power thus conferred upon them, is strikingly shown in the systematic manner with which the immense number of wounded, after the battles of the Wilderness, Spottsylvania Court House, Cold Harbor, Petersburg, and of the campaign in Georgia and the Carolinas, were cared for on the battle-field, were removed to field and base hospitals, and were finally distributed in general hospitals throughout all parts of the United States. Notwith-

standing the opinion of General H. W. Halleck, no panics or stampedes were reported as having been caused by the presence of non-combatants of the ambulance corps.

Major Heizmann, Med. Dept. U. S. A.,* in his admirable paper on Military Sanitation in the 16th, 17th, and 18th centuries, writes: "The persistence of regimental hospitals in England and America to the beginning of the present century is a relic of the company methods of the 16th century." England learned in the Crimean War the utter inadequacy of such sanitary organizations; but it was not until the War of Secession, in the face of a threatened break-down, and literally under fire, that we abandoned a method which for a hundred years had in other armies been relegated to history. Major Winne, Med. Dept. U. S. A.,† writes: "Our sick and wounded in Mexico had no special provision made for them. The regulation temporary details for field service were taken from the line," etc., etc. He further says: "The outbreak of the Civil War found us absolutely without organization of any kind for taking prompt care of large numbers of wounded. None but those who served in the field then can realize the chaos which existed."

What was finally accomplished, and at what cost, is a part of the history of that terrific struggle. Our author concludes: "The greater number of the medical officers who distinguished themselves in our war, by carrying the operations of their department to a height of usefulness and perfection never before known, and which won the unqualified admiration of Europe, have passed away. It is needless to recapitulate their names; their monument is perpetuated in the Medical and Surgical History of the War. 'Monumentum aere perennius,' and as, in the noble words of Lord Bacon, 'They attained worthy ends and expectations,' their memories are cherished in the hearts of their surviving comrades."

With the close of the war, so rich in dearly-bought experience, the Medical Department, apparently content to embalm that experience between the covers of its great history, returned to the methods of antebellum days, and the army again became the advance-guard

*Journal of the Military Service Institution, U. S., No. 64.

†Ibid, No. 52.

of civilization upon our western frontier. Since Appomattox a generation of medical officers has grown up who know not war, and whose experience, gained at best in Indian outbreaks and expeditions, but ill fits them to meet the exigencies of that for which alone they exist. The art of war in its destructive phases is for the line officer; the art of military sanitation, the most special and yet most comprehensive of all the specialties of our profession is for the medical officer.

The history of the Medical Department since 1865 may be outlined as follows: On July 28, 1866, the following act of Congress became law:

The Medical Department of the Army shall consist of one surgeon general, with the rank of brigadier general; one assistant surgeon general, with the rank of colonel of cavalry; one chief medical purveyor and four assistant medical purveyors, with the rank of lieutenant-colonel of cavalry; sixty surgeons, with the rank of major of cavalry; one hundred and fifty assistant surgeons, with the rank of lieutenant of cavalry for the first three years of service, and the rank of captain of cavalry after three years of service. * * *

On March 3d, 1869, all promotion and appointments in the Medical Department (and other staff corps), were suspended, and thereafter till 1874 the Department simply marked time. Never since its reorganization had all its offices been filled, and in 1874, when examinations for appointment were reinstituted, there were nearly sixty vacancies.

By act of Congress approved June 23d, 1874, the Medical Department of the Army thereafter consisted of one surgeon general, with the rank, pay and emoluments of a brigadier general; one assistant surgeon general, and one chief medical purveyor, each with the rank, pay and emoluments of a colonel; and two assistant medical purveyors, with the rank, pay and emoluments of lieutenant colonels; * * * fifty surgeons, with the rank, pay and emoluments of majors; one hundred and fifty assistant surgeons, with the rank, pay and emoluments of lieutenants of cavalry for the first five years service, and with the rank, pay, and emoluments of captains of cavalry after five years service * * * "and all original vacancies in the grade of assistant surgeon shall be filled by selection by competitive

examinations; and the Secretary of War is hereby authorized to appoint, from the enlisted men of the army, or cause to be enlisted, as many hospital stewards as the service may require, to be permanently attached to the Medical Department, under such regulations as the Secretary of War may prescribe."

The permanent attachment of hospital stewards to the Medical Department, reiterated in this law, was the germ of an organization which thereafter sprang into existence, and which is destined to radically change the methods that have for so many years obtained in our service, methods which were only temporarily changed even to meet the exigencies of the most stupendous war the world has seen. The act of June 26th, 1876, declared that the number of assistant surgeons now allowed by law shall be reduced to one hundred and twenty-five and * * * that from and after the passage of this act, in addition to the grades now allowed by law, there shall be four surgeons with the rank, pay and emoluments of colonels; eight surgeons with the rank, pay and emoluments of lieutenant colonels, to be promoted by seniority from the medical officers of the army. * * * *

No further legislation affecting the Medical Department became law until March 1st, 1887, when the following act was passed:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Hospital Corps of the United States Army shall consist of hospital stewards, acting hospital stewards, and privates; and all necessary hospital services in garrison, camp, or field (including ambulance service), shall be performed by the members thereof, who shall be regularly enlisted in the military service; said corps shall be permanently attached to the Medical Department, and shall not be included in the effective strength of the army, nor counted as part of the enlisted force provided by law; that the Secretary of War is empowered to appoint as many hospital stewards as, in his judgment, the service may require, but not more than one hospital steward shall be stationed at any post or place without special authority of the Secretary of War.

That the pay of hospital stewards shall be forty-five dollars per

month, with the increase on account of length of service, as is now or may hereafter be allowed by law to other enlisted men. They shall have rank with ordnance sergeants, and be entitled to all the allowances appertaining to that grade.

That no person shall be appointed a hospital steward unless he shall have passed a satisfactory examination before a board of one or more medical officers as to his qualifications for the position, and demonstrated his fitness therefor by service of not less than twelve months as acting hospital steward. And no person shall be designated for such examination except by written authority of the Surgeon General.

That the Secretary of War is empowered to enlist, or cause to be enlisted, as many privates of the Hospital Corps as the service may require, and to limit or fix the number, and make such regulations for their government as may be necessary; and any enlisted man in the army shall be eligible for transfer to the Hospital Corps as a private. They shall perform duty as wardmasters, cooks, nurses, and attendants in hospitals, and as stretcher-bearers, litter-bearers, and ambulance attendants in the field, and such other duties as may by proper authority be required of them.

That the pay of privates of the Hospital Corps shall be thirteen [since increased to eighteen] dollars per month. With the increase on account of length of service as is now or may hereafter be allowed by law to other enlisted men; they shall be entitled to the same allowances as a corporal of the arm of service with which on duty.

That privates of the Hospital Corps may be detailed as acting hospital stewards by the Secretary of War, upon the recommendation of the Surgeon General, whenever the necessities of the service require it; and while so detailed their pay shall be twenty-five dollars per month, with increase as above stated. Acting hospital stewards, when educated in the duties of the position, may be eligible for examination for appointment as hospital stewards, as above provided.

Loosely drawn and elastic as is this law, no act of Congress since that of 1847 which for the first time recognized the military

status of the medical officer, is more important to the present efficiency of the medical department, and its future usefulness. All the regulations governing this organization are of necessity based upon this law, and very well meet the current requirements of the various detachments scattered throughout the country, but such active service experience as has been gained therewith has shown that a more closely knit military organization is necessary. This is directly in a line with the experience of military medical officers in other armies, and there can be no question that a very much more detailed organization than now exists in the hospital corps will be necessary when we find ourselves, as we soon surely will, in the midst of a war. Let us hope that we will not again have to organize under fire.

To obviate the defective organization above set forth, a bill was introduced in Congress, in December, 1892, as follows:—

That the companies of the Hospital Corps organized by the Secretary of War in the Medical Department of the Army are hereby established upon the same military status as companies of infantry, and shall hereafter be known as companies of the Hospital Corps.

That each company shall consist of eight hospital sergeants, one of whom shall be selected as first sergeant, and one as quartermaster sergeant, six hospital corporals, two musicians, one artificer, and as many privates, not exceeding one hundred, as the President may direct.

That the hospital sergeants shall be detailed as such from the hospital stewards, the hospital corporals from the acting hospital stewards, and the remaining members of the companies from the privates of the Hospital Corps U. S. Army, and each shall receive only the pay of his grade in the Hospital Corps. That the necessary officers to command the companies of the Hospital Corps shall be detailed from the Medical Department U. S. Army. That the President is authorized to organize for bearer, ambulance, field hospital, and other like service such companies of the Hospital Corps as he may deem necessary.

That all acts or parts of acts inconsistent with the provisions of this act are hereby repealed.

This bill passed both houses substantially as introduced, but in the last hours of the session failed of the President's signature.

The Company of Instruction organized by the compiler, at Fort Riley, Kansas, under authority of the Secretary of War, as a training school for men of the Hospital Corps, still exists, and is doing good work; but its organization is of necessity only of the most temporary and tentative character. That it has proved its right to exist, is shown by the testimony of all who are familiar with its excellent results.

The following act of Congress was approved July 27th, 1892.

That from after the passage of this act, the grade of certain medical officers of the army below that of Surgeon General shall be as follows:—

Those holding the rank of Colonel, Assistant Surgeon Generals; those holding the rank of Lieutenant-Colonel, Deputy Surgeon Generals. That before receiving the rank of Captain of Cavalry, Assistant Surgeons shall be examined under the provisions of an act approved October 1st, 1892. * * *

That medical officers of the Army may be assigned by the Secretary of War to such duties as the interests of the service may demand.

That all acts or parts of acts inconsistent with the provisions of this act are hereby repealed.

The third section of this act abrogates Section 1169 of the Revised Statutes, viz:—"Officers of the Medical Department of the Army shall not be entitled, in virtue of their rank, to command in the line of the army or in other staff corps;" and places the Medical Department in the same category with the other staff corps, as set forth in paragraph 16, Army Regulations, 1889.

From the foregoing it will be observed that there exists to-day in the Medical Department of the United States Army no detailed scheme of organization for active service.* The war scheme pro-

*The paragraphs (1590 to 1602) of Army Regulations, 1889, under the caption "Hospital and Ambulance Service in War," give a general outline of sanitary organization; this outline embraces simply the principles of battle-field assistance and fails to enter into the details of organization so essential to successful work, hence it may be justly said that in the Medical Department of the United States Army there exists to-day no detailed scheme of organization for active service.

mulgated by the law of 1864, which ceased to actively exist with the surrender of the Confederate forces, was abrogated by the peace scheme of 1887, which provides that "all necessary hospital services in garrison, camp, or field, (including ambulance service), shall be performed by the members of the hospital corps." Contrasted with the almost perfect sanitary organization of other armies our own unpreparedness in this direction points a moral we can ill afford to ignore.

Governor's Island, N. Y., April, 1894.

OBSERVATIONS UPON THE MEDICAL DEPARTMENT
OF THE BRITISH ARMY.—ABRIDGED FROM AN
OFFICIAL REPORT OF OBSERVATIONS MADE IN
1891.

BY BREVET LIEUTENANT-COLONEL ALFRED A. WOODHULL,

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[Publication authorized by the Secretary of War.]

The Medical Department of the British Army consists of about 800 commissioned officers, known as the Medical Staff,* and about 2400 soldiers known as the Medical Staff Corps. These officers are of every grade except that of brigadier general, from lieutenant [first lieutenant] to major general inclusive, and have those titles with the prefix of surgeon to each. In the grade of lieutenant colonel there are both surgeons and brigade surgeons, the latter being the senior. The medical officers are grouped as executive and administrative, the colonels and major generals comprising the latter.

Thirty-five quartermasters, with the honorary rank of lieutenant, captain, and major, also belong to the Medical Department. They are appointed from the warrant [non-commissioned staff] officers of the Medical Staff Corps.

The number, method of appointment, designation, rank, grade, pay, tenure of office, and conditions of retirement, are not fixed by law, but may be altered by Royal Warrant, which, at least as regards

*Very lately designated Army Medical Staff.

pay and numbers, indirectly rests upon the annual Vote [Appropriation] for the army.

In advancing from one grade to another an officer receives no new commission, but the publication in the "London Gazette" of promotion and other changes is an official announcement for all military purposes. The Monthly Army List [Register] also is an authoritative recognition of an officer's status. His original commission is worded to cover "such promotion as he may receive in Her Majesty's Forces." A small payment is required for this original commission.

All original appointments in the Medical Staff are in the lowest grade, that of surgeon-lieutenant. These are selected from civil life either by a public competitive examination, held twice a year, for not less than half the number of vacancies that may have occurred within the preceding six months, or by selection by the Secretary of State for War from nominations by the governing body of a public school of medicine. These latter must be certified by the nominating body as qualified according to a standard laid down by the Secretary, and shall be approved by the Director General. In fact very few such selections are made, although the power is occasionally exercised; but the practical effect of the expedient is to enable the executive to fill vacancies in emergencies. Those selected rank after those examined of the same date.

A candidate for examination must have a diploma or license to practice both medicine and surgery in Great Britain and Ireland, must be of unmixed European blood and between 21 and 28 years of age. Marriage was at one time a bar, but it is not now. Age, good moral character, regular habits and probable credit to the service, are established by certificates which, with his own declaration of physical soundness, are submitted upon official forms in advance to the Director General. An entrance fee of £1 is charged against each applicant, payable when he is pronounced physically fit. A board of medical officers, not the professional examiners, determines his physical condition. He must be found free from any condition that is likely to unfit him for service in any climate. Moderate

myopia without organic disease of the eye does not disqualify, but he must not require glasses to perform any operation.

Candidates for the Army and for the Queen's Indian Service are examined at the same time, by the same Board, under the same professional tests. The number of vacancies in each service is set forth in the announcement, and candidates must declare in advance for which service they compete. The Secretary for War may reject any candidate whose bad spelling or composition shows a deficient general education. This appears to be the only direct test made of general information, and it is not applied by the Board itself.

The Examining Board is a permanent body and contains no medical officers of the army. At this time (1891) the examiners are Sir Joseph Fayrer, a distinguished retired Indian officer, in anatomy and physiology; Sir William Aitken (since deceased), a professor at Netley, in medicine and therapeutics; Mr. George J. Pollock, F. R. C. S., in surgery; and Dr. George J. Allman in chemistry, pharmacy and the natural sciences. The examiners in German and French are natives of those countries. The connection of a professor in the Army Medical School with the Board is incidental, not necessary.

The compulsory subjects and the attainable maxima are:

Anatomy and Physiology	1000	marks.
Surgery	1000	"
Medicine, including therapeutics and the diseases of women and children	1000	"
Chemistry and Pharmacy, and a practical knowledge of drugs	1000	"

The voluntary subjects and their values are:

French	150	"
German	150	"
Natural Sciences	300	"

The examination in chemistry is limited to the elements of the science and to its application to medicine, pharmacy, and practical hygiene. That in medicine and surgery involves diagnosis and prescription in both subjects for actual patients, and operations upon the cadaver. Modern languages are officially announced as of great importance. The natural sciences include comparative anatomy.

zoology, natural philosophy, physical geography, and botany with special reference to the *materia medica*.

No candidate is eligible who does not attain at least one-third of the possible marks in each compulsory subject. Accession to the list and standing in it are determined by the aggregate marks in the compulsory and voluntary subjects. It is therefore possible, although it is not usual and perhaps never occurs, for a candidate to be accepted who does not receive more than one-third of the attainable marks in the compulsory group. And it also follows that, with so low a possible minimum, the actual minimum changes with each examination, the quality of the accepted class probably being inversely as its size; for men are accepted in accordance with but not in excess of the vacancies, nor is a high standard necessarily maintained by the establishment of a high minimum regardless of the places to be filled. Candidates technically qualified, that is, those who gain one-third or more of the compulsory marks in excess of announced vacancies, have no claim upon vacancies that may occur later. Therefore, when the vacancies are few the relative standard will be high, and when there are many it may be low. No candidate may come up more than twice. For the Indian Service candidates of Asiatic blood may compete.

It is a matter of domestic criticism that to allow voluntary subjects to count in the final standing, renders it possible for a candidate who has had special advantages in their acquisition to be classed higher than one who is his professional superior. This is said to show particularly in the Indian examination, where Hindustani may be taken as an additional voluntary. I do not think that this would be a valid objection were the professional minimum kept sufficiently high to insure unquestionable competence therein, for the few voluntaries are in the direct line of efficiency.

This abridgment does not give space to describe the examination in detail. Those interested can learn it by application to the writer, or by obtaining an extract from the full report on file in the War Department. I may express the opinion, however, that there is nothing in the entrance examination, possibly excepting a better opportunity for bedside work in it, that is as well adapted to

our purpose as our existing methods. To give the corps itself no election as to whom it may receive, to ignore the important subject of general education, to attach no value to probable "aptitude," is to assume that the Medical Department itself is incompetent to judge of official qualifications or is too biased to be equitable, and is a body of whose wants others are the best judges and into which may be injected any one who can pass certain intellectual tests of limited scope. The right of self-perpetuation is one of the bases of *esprit de corps*. The English method of establishing a very low minimum and accepting as many candidates who pass the line as may be required, may be necessary in order to keep the establishment numerically efficient. It has nothing else to commend it. It is saved from practically destroying the corps by the excess of applicants over the places, who thus force up the real minimum. As there are fewer vacancies in the Indian service, the candidates for it, speaking generally, are consciously better equipped, and I think I am right in assuming that the average standing of the accepted "Indians" is higher.

Accepted candidates become "surgeons on probation," and proceed to the Army Medical School for further instruction and final examination. They are entitled to wear undress uniform without the insignia of rank or swords, receive pay at the rate of eight shillings (\$1.92) a day, and are provided with a furnished room in public quarters or with a money allowance in lieu. They are required to take their meals at the military mess. At the conclusion of the Netley course they are examined in it by the professors, and to pass they must attain one-third of the possible marks in each subject. The marks they gain at Netley are added to those they received at the entrance examination, and they are commissioned as surgeon-lieutenants, taking rank among themselves according to their aggregate marks. Failure in the Netley examination terminates their connection with the army. The professors, in connection with the Principal Medical Officer of the General Hospital at Netley, are required to report any surgeon on probation whom, after careful observation, they believe unsuited to become an officer through faults of character or conduct. Any one so reported upon

shall not receive a commission. Those recommended for commissions as surgeon-lieutenants are then sent to Aldershot for six or eight weeks' further instruction in purely military matters. When gazetted they begin to receive pay at the rate of £200 (\$968) a year and certain allowances, and they acquire swords and the insignia of rank. The Indian candidates go to Netley, but not to Aldershot. Accounts of the two schools will appear later, if space permits. Their standing at the Aldershot examination does not affect the relative position of these young officers, but failure to pass it renders an officer liable to be sent back at his own expense to join the next class for further instruction. Having passed Aldershot, officers go on ordinary duty.

Promotion to, not including, the grade of brigade-surgeon-lieutenant-colonel ordinarily occurs by seniority, but in exceptional cases promotion to any grade may be by selection. Such special reward is occasionally given for gallantry in action or for other special service, but it does not supersede the necessity for examination, and curiously does not carry with it the officer's advance to the next higher grade when he has reached the top of the list. Thus, a captain becoming a major by special promotion remains the senior major until all whom he has passed have in turn been promoted over him. In other words, he enjoys the advantage of early and prolonged possession of a higher rank, but his ultimate advancement is not hastened thereby, neither does his advancement retard the promotion of any other. Ordinarily a medical officer becomes a surgeon-captain after three years and without examination. After twelve years' total service and an examination he becomes a surgeon-major. The examination usually takes place at the end of ten years, and is by correspondence on papers upon surgery, surgical anatomy, medicine and medical pathology by two civil teachers, upon practical hygiene by the professor at Netley, and upon military law, etc., by an administrative officer selected by the Director General. The officer must also furnish a certificate from a recognized teacher in surgery that he is a competent operator, and he must make a practical report upon a subject selected by himself. All these papers go through the Director General to the various ex-

aminers, who certify the result to the Director General. An officer who fails is given a second opportunity later, but he is not promoted until he passes.

After 20 years' total service a surgeon-major becomes a surgeon-lieutenant-colonel. The brigade-surgeon-lieutenant-colonels, surgeon-colonels, and surgeon-major-generals are selected from the respective next lower grades on the recommendation of the Director General. Certain foreign service is necessary to qualify for these higher grades, whose number is not fixed by law. They are filled at the discretion of the Secretary for War, and generally are about 50, 25, and 10.

The Director General may be taken from any grade on the active or the retired list, but almost invariably he is selected from the highest grade on the active list. He holds office for seven years, irrespective of age, unless physically disqualified. All other medical officers below a lieutenant-colonel must retire at fifty-five, or if a lieutenant-colonel or higher, at sixty. But a medical officer may be retained on active service until sixty-two, in the discretion of the Secretary. This is exercised chiefly in the case of administrative officers on foreign duty, where too frequent changes would be injudicious.

Besides these compulsory retirements, medical officers upon the completion of different lengths of service, may leave the army absolutely and receive gratuities of considerable amounts, or they may retire after fixed periods with a continuing reduced pay known as pension. The conditions under which retirements occur change from time to time, according to warrant. This voluntary renunciation of active service makes promotion relatively rapid, but at the same time the army loses many trained men in the prime of life, and the sentimental attachment to the service, which is a considerable element of efficiency, is liable to be weakened. Retired medical officers may be employed at their own request at home stations on recruiting and prison duties, when they receive additional pay. There are no longer, as formerly, regimental medical officers; but medical officers are still attached to the regiments of the Guards

for duty as such, and as far as practicable the Guards are treated in regimental hospitals.

GENERAL DUTIES.

"The officers of the medical staff and the men of the medical staff corps will be under the control and command of the Director General of the Army Medical Department." (Queen's Regulations.)

The medical staff are charged with the medical care of the sick, the administration of military hospitals in peace and war, the command of the medical staff corps, and with the duty of recommending to the commanding officer, orally or in writing, any precautionary or remedial measures as to barracks, encampments, stations, hospitals, transports, diet, dress, drills and duties, which, in their opinion, may conduce to the health of the troops and the mitigation or prevention of disease.

The duties of medical officers with troops in quarters are the charge of the troops, attendance on officers, women and children, and sanitary duties. Each station has at least one hospital, and at the larger stations there are several. All the duties may be discharged by one medical officer, but generally there are several, of whom the senior, who may call on the others for assistance if necessary, is usually in charge of the hospital. At very large stations the medical officers in charge of the troops and of the hospital may bear no military relation to each other except common subordination to the Principal Medical Officer.

MEDICAL INSPECTION.—[SICK CALL.]

One medical officer of rank and experience to a brigade is the ordinary proportion for this duty. Except at very small stations, an inspection room is set apart in the barracks and a permanent orderly, frequently a non-commissioned officer, not of the medical staff corps, is furnished by the commanding officer, for all medical duties. A small number of surgical appliances and a few medicines are kept there under lock and key. These are simple and elementary and are not selected by the officer prescribing. Medical inspection [sick call] is held daily in time to allow the men so designated to reach the hospital before the morning visit, which is 9 or 10 a. m., ac-

according to season and place. A regimental non-commissioned officer carrying duplicate company sick reports, conducts all the sick of each regiment. These company sick reports are slips of paper about the size of a third of a foolscap page. They give the organization, the place and date; each man's regimental number, his rank and full name, and if married that fact; completed years of age and of service; religion; if for duty (designated for detail); whether a defaulter (undergoing light punishment); with blank columns for the medical officer's remarks and initials. The report is signed by the orderly non-commissioned officer. It is never in book form, but is always in loose duplicate sheets. It bears upon its back a form used for another purpose. The orderly non-commissioned officer is the one taken by roster who is the executive non-commissioned officer for the time. He is something more than our non-commissioned officer in charge of quarters, and is not quite but very nearly a temporary first sergeant. The detail usually runs for a week. The Color Sergeant (who has nothing to do with the colors) for infantry, and the Troop Sergeant Major for the mounted corps, most nearly but not entirely correspond to our First Sergeant. The sick report is not signed by any officer, and there seems to be no obstacle to any soldier who so desires coming before the medical officer. The regulations speaks of "all men who report themselves sick." They do not expressly provide the manner of going on sick report, but it is substantially as follows: Soon after reveille the company orderly-corporal gives to the company orderly-sergeant the names of those reporting sick and receives from him the sick report, which he gives to the "sick orderly-corporal," a regimental, not a company detail. The reporting sick fall in at the appointed hour with their kits in their valise bags and cleaning bags. They are marched to the inspection room and those who are to be admitted to the hospital are sent back for their bags, unless the inspection is held at the hospital, when all take their bags with them. The medical officer examines the men and all unfit to attend parades or perform ordinary duty are to be removed to the hospital. The medical officer notes the disease if diagnosed, marks hospital for those who need it, makes such remarks as he desires, and signs his initials. If made at an inspection

room, and therefore to be reviewed at the hospital, these entries are in pencil. The regulations forbid any convalescents or sick, except those who immediately after vaccination have light duty assigned them, to remain in quarters. They direct that those who require only trivial dressings or medicines shall be dealt with on the spot, marked "medicine and duty," and returned to barracks. Men temporarily unable to perform all their duties may be recommended for light duty for the day, but at the end of twenty-four hours they will either return to duty or be sent to hospital. Obviously certain conditions, such as blistered feet, boils, temporary ailments medical or surgical, can not be completely disposed of so summarily, but if sent to hospital they might occupy beds required for graver cases. In practice such cases are carried in quarters newly marked each day for several days in succession as "attending," which is the equivalent of "medicine and duty." The medical officer marks "Duty" against the man whom he thinks "reported himself unnecessarily." This does not mean where the man has a reasonable doubt, but where he is malingering. Every man marked simply "duty" receives summary punishment in the company. A man who intentionally aggravates his disease is also punished. This includes more than active interference with his condition. All recruits are instructed, and it is republished as a standing order to each company once in three months, that all soldiers contracting venereal disease are to report themselves sick without delay. Any concealment of venereal, although only for a very short time, is regarded as aggravation and is reported to the commanding officer for punishment. Both copies of the sick report are returned to the sick orderly-corporal, who takes the designated men with their kits, not including their arms, to the hospital. (This regulation as to kits is not universally enforced, some regiments arranging to retain them in their store-room.) One of the sick reports is left at the hospital and the other goes back to the company. The medical officer keeps in the inspection room a rough list of men whom he excuses, and an official diary. This resembles a condensed morning report in our service, and is merely for his convenience. The regulations contemplate no special or daily report of the sick by the medical officer to the commanding

officer. But at some large posts a daily or weekly state [report] of sick is made to the brigade major [Adjutant General of Brigade]. It is in manuscript, copied from the diary. This is necessarily incomplete, and might be compiled more accurately in the regimental orderly rooms; for the medical officer does not know certainly the ultimate disposition of those he has sent to the hospital. At the same time and place the medical officer inspects prisoners before trial or confinement. They are certified as "fit," or are sent to hospital and undergo trial or punishment after discharge therefrom.

Officers' names are not entered on company sick reports, but when an officer is placed on or is taken off the sick list the medical officer reports it direct with as little delay as possible to the regimental commander and to the officer in charge of the station hospital. The medical officer makes no further report in connection with inspection [sick call] than as stated. Cases occurring later are seen by him or by the orderly medical officer, and if necessary these, as well as all too ill to appear at inspection, are taken direct to the hospital, and their names appear on the next morning's sick report, with an explanation of their disposition.

A practical difference between the two services is the failure of the British to account in medical statistics for any sick not in hospital, while in fact there are always some in quarters accounted for on the company reports as "attending," for "medicine and duty," or "detained." These are recognized on the "parade state" [morning report] of the company, which has two headings for sick, viz.: in hospital and in quarters. This enables the commanding officer to know the exact state of his command, while the medical reports are not encumbered with cases of no clinical or other importance, and that diminish only for the moment, if at all, the virtual fighting strength.

Brief observation at one or two stations is insufficient for generalization, but as far as it went I was impressed with the rigor exercised in taking up men as sick. Soldiers that I should not have hesitated to excuse were summarily marked "medicine and duty," and disposed of by a dose of physic in a very bald form or by a dressing. This was done and accepted as a matter of course, with no un-

kindness of manner on the officer's part and no sullenness on the man's. On the other hand, many were taken into hospital that we should have efficiently treated in quarters without disturbing company discipline. The prominent feature of this part of the service is the men's perfect freedom of access to the medical officer, without the intervention of a commanding officer, and the entire dependence upon the medical officer to discriminate between worthy and unworthy applicants. No unprofessional judgment prevents the soldier from presenting himself; but "Duty" without further comment leads the malingerer to prompt punishment.

The medical officer inspects the regimental cells daily, and sees every prisoner confined there. He inspects every regiment or detachment before it leaves a station, to insure the detention of all the sick. He makes a health inspection of the men under his charge once a week for personal cleanliness, for itch, cutaneous or acute disease, ulcers, and ailments indicated by the countenance or skin, as fever, small-pox, scurvy, etc. A man who neglects reporting himself when diseased is to be brought to the notice of the battalion commander. This is enforced when wilful, not ignorant, neglect or concealment is discovered. Upon receiving notice of sudden death out of hospital, of severe accident, or of infectious disease in quarters, he at once reports the fact direct to the commanding officer of the station and to the senior medical officer present.

When troops are under orders for foreign service or to go abroad, the medical officer is furnished with a duplicate nominal roll, which states their age and length of service and has columns for his remarks and for the Principal Medical Officer's. He thoroughly examines each man as to his fitness, and the Principal Medical Officer marks on the roll his decision as to their general fitness. One copy is retained by the Principal Medical Officer and the other goes with the troops. Slight cases of venereal or other ailments, and convalescents likely soon to recover, may be embarked for ordinary but not for active service abroad, and are admitted to the hospital on board for treatment. No ruptured soldier is sent to India. The day after embarkation, except on a coastwise voyage at home, the medical officer inspects for venereal all soldiers except the non-commissioned

officers and the married men, and takes into hospital all cases found. This inspection is repeated seven days later. All cases, however slight, are transferred to their destinations under medical supervision and treatment. (Service with troops on shipboard is omitted.)

Nearly all of these various rules look to the early detection of disease among large bodies of careless men, and to the desirability of landing troops for foreign service in good condition. With reasonably vigilant non-commissioned officers, such extreme care would seem to be superfluous with our ordinary rank and file; but there the prevalence of cutaneous disease (5.6 per cent of all cases at a large station) warrants it.* In the event of hostilities, it would be the duty of our Medical Directors to recommend, and it would come within the province of our general officers to order, such inspections for troops about to take the field.

Medical attendance is furnished by the medical officer in charge of the troops, or by one specially assigned to the duty, to officers and their families and to the families belonging to such troops who are entitled thereto. The commanding officer supplies the Principal Medical Officer each month with a nominal roll of all persons, including civilian servants, not enlisted soldiers or members of their families, with the rank or occupation and address of each who claims attendance. An officer is entitled to medical attendance only when a medical officer or private practitioner has been assigned to such duty and when the officer resides within a mile of the hospital or of some officially designated point. But officers injured on duty may, with the assent of the Director General, recover reasonable medical expenses should a medical officer not be available. Officers may be admitted to any hospital where their accommodation is authorized, for wounds in action or illness in the field. Those sick under other conditions are admitted only when a board of medical officers recommends, and are then charged regulation stoppages. Officers' wives and children are only entitled to attendance when the officers they depend on are serving as first stated.

At large stations the medical officer specially assigned to the

*In 1889 there were 26.5 admissions for scabies per 1,000 of mean strength in the British army, against .87 in that of the United States.

care of families has a separate inspection room. Officers' civilian servants, kept as such within the maximum number, are required to attend at the inspection room at fixed hours unless illness prevents, when they will be visited at their masters' residences if within the mile limit. Warrant [non-commissioned staff] officers and their wives and children are ordinarily treated in quarters, but may be admitted to appropriate hospitals when absolutely necessary. When these men are absent on duty, their families are entitled to attendance if within the mile limit. Obstetrical attention can not be claimed for the wives of officers or soldiers, unless the latter are taken in hospital, if civil care can be obtained, except assistance in case of danger is requested. The wives of the men on the married roll and their children under the age of fourteen who reside within the mile radius, whether the soldiers are present or absent on duty, receive attendance when a medical officer or private practitioner is assigned. The women and children attend at the inspection room unless unable to do so, when they are visited. The necessary medicines and appliances that are allowed all the foregoing are procured from the hospital on specific prescriptions, at such hours as may be fixed that will not interfere with the working of the hospital, and they are furnished at other hours only in emergency. Medical officers are at liberty to attend the families of married soldiers not on the married establishment and to supply them with public medicines at the discretion of the Principal Medical Officer. According to my observation such voluntary attendance, although a very great tax on their time and patience, is freely rendered and much appreciated.

At the larger posts there are hospitals for cases of parturition and general diseases among soldiers' families, but the limits of this abridgment will prevent a detailed account.

The requirement for officers to reside within a mile of a fixed point in order to receive medical attendance, depends upon the custom that not only permits but necessitates the extra-mural residence of many married officers. The official allowance of quarters, excepting for seniors and at particular stations, does not contemplate the most of the officers being domiciled with families within

the lines. There are however many exceptions to this exterior residence.

It will be noticed that the other conditions under which officers receive attendance are narrower than with us, and are arranged to check public expenditure. The principle by which the individual rather than the government bears charges that we regard incidental to the public service, receives constant illustration in the British methods.

It is not within the scope of my instructions to discuss the married roll and its apparent influence. But I may say that that of the British army, judged by any ordinary measure of a combatant force, is enormous, and thus draws deeply on the medical as well as on other resources of the establishment. In some instances the soldiers' families are quartered on the barrack square, with the outhouses for women and children side by side with those for men; in others they are in rear of but always near the company lines. In the better posts they do not form a distinct cantonment of their own. Exact sanitary discipline is exercised to keep these people in reasonable health, and, as noted, daily medical inspection [sick call] is held at a fixed hour, which is attended by all the indisposed able to leave the house. To prevent hardship, an orderly medical officer [officer of the day] is available for emergencies.

SANITARY DUTIES.

The medical officer charged with sanitary duties, or should there be no such officer then the one in charge of troops, is required to carry out these particularly described duties: To visit and advise as to gymnastic exercises; to examine the food and drink vended at the canteen; to determine whether the cooking is sufficiently varied; to ascertain the quality and amount of the drinking water; to inspect monthly, under the direction of the commanding officer, all filters used in barracks, and to report to him their condition; to ascertain that the cubic space per man is not less than 600 ft. in barracks, and 400 ft. in huts, and that the number of men in occupation is noted on the proper form. He must satisfy himself that every barrack guard room and cell is suitably lighted and is suffi-

ciently ventilated to keep the air pure by night as well as by day; that married soldiers' quarters, schools, reading room, kitchens, wash-houses, lavatories, urinals and latrines are suitably ventilated and lighted; that beds and bedding are exposed to the air and the walls and ceilings are limewashed as the regulations require. When troops are billeted he ascertains by visits that the men's quarters are warm, ventilated and not overcrowded, and that their bedding is clean and dry. He is required to visit every portion of the barracks at least once a week, to examine their general sanitary condition and cleanliness. He notes in his sanitary diary such examinations, the defects discovered, the representations made to the commanding officer, and the result of the representation. He recommends to the commanding officer, orally or in writing, whatever he may consider necessary to protect the health of the troops, whether as regards the abatement or removal of local causes of disease or as to any alteration of diet, clothing, drills or duties. He also recommends the precautions he thinks necessary on the appearance of epidemic disease among the troops or neighboring civilians.

The medical officer transmits to the Principal Medical Officer [Medical Director] copies of all written recommendations made to the commanding officer; and, should he forward sanitary suggestions to the Principal Medical Officer, he furnishes a copy to the officer commanding the troops. In addition, he makes a special written report when disease unusual in amount or infectious in nature appears among the troops or families in his care. This is sent to the commanding officer, and a copy to the Principal Medical Officer, through the officer in charge of the station hospital [Post Surgeon], who records it in his remarks on the Weekly Return of Sick.

Every medical officer in charge of troops, a military prison, or a military school, furnishes to the Principal Medical Officer a Quarterly Sanitary Report on a form, accompanied by a Distribution Return also on a form. The first specifies the regiment, its barracks and station, gives its average strength, its average daily sick, its total hospital admissions and its deaths during the quarter, and the number in hospital on the last Friday of the quarter. These facts are followed by thirteen summaries of the sanitary subjects just enumerated

under appropriate headings, and a note of the amount of the hospital accommodation.

The Distribution Return gives the names of each barracks and of the corps occupying it, the average strength and estimated accommodations in each barrack, the admissions during the quarter of all diseases, of enteric fever and of all other fevers separately, of dysentery and diarrhoea together, the number in hospital on the last Friday in the quarter, the hospital in which treated and the accommodation in each hospital, with remarks.

The medical officer in charge of the troops makes annually to the officer in charge of the station hospital a manuscript report upon the improvements that have occurred during the year as to cubic space and ventilation in quarters, facilities for ablution, extended means for variety in cooking, alterations in diet, changes in clothing having reference to climate and season, improved drainage, and the influence of gymnasia upon the health of the troops. The regulations supply for the assistance of the medical officer a copious and convenient outline of the particulars of such reports. When relieved from duty with troops, a medical officer is supposed to supply his successor with this report completed to that date. The reports are attached to the annual return of the hospital. The materials for them are the weekly observations in the sanitary diary.

The Sanitary Diary and our Medical History of the Post are analogues, except that in the diary the entries are made more frequently and it is an individual more than a station record. There is no substantial difference in the kind of sanitary report required in the two services. In the British service, however, there is no formal provision by which the views of the commanding officer are made known to the medical officer; and, as will appear in other instances, the commanding officer is not a channel of communication to the Principal Medical Officer. Both officers, however, are furnished with the same material. In this field, as in most others, their regulations enter into very minute directions, which with us are left as the natural inference from general instructions. The chief advantage of this is that no other branch of the service can look upon a zealous medical officer as intruding, and no medical officer

can find apology for not covering the whole domain of prevention.

A medical officer having charge of troops, sanitary duties, or attendance on officers and families, furnishes the medical officer in charge of the station hospital, not later than Friday afternoon of each week, with all the details pertaining to those duties required to complete the **Weekly Return of Sick**.

HOSPITALS AND HOSPITAL SERVICE.

Hospitals are either Station or General. A Station Hospital is the exact equivalent of our post hospital in its purpose, in contradistinction to the regimental hospital that at one time prevailed and that is still found in a modified degree with the Guards. Its administration requires a medical officer in charge, and, according to its size, attached medical officers, a quartermaster, one or more warrant and non-commissioned officers and privates of the Medical Staff Corps.

A General Hospital receives the sick sent from abroad technically known as "invalids," the local sick, and others entitled. Its staff differs from that of a station hospital chiefly in being more numerous. The officer in charge is known as the Principal Medical Officer and comes from the administrative group. An officer is especially detailed as his Secretary, or as we would say, Executive Officer, and is known as the Registrar, and medical officers are directly in charge of divisions. Each General Hospital has a Lady Superintendent and a staff of nursing sisters. The larger station hospital's also may have a staff of nursing sisters.

The Quartermaster, as will be explained elsewhere, is an officer with honorary rank appointed from the staff sergeants. His general duties are those of the custody of all kinds of hospital property, and his position is similar to that of a Medical Storekeeper, assuming one were attached to a hospital, with certain military duties added. When none is attached, the quartermaster's duty is divided between the wardmaster and the steward.

The Wardmaster is invariably the senior warrant or non-commissioned officer. He is a sergeant of some grade, and corresponds to our executive or senior steward. The title is that of an office and

not of a grade, and the office closely resembles that of sergeant-major. We copy the title in speaking of privates as wardmasters (A. R. 1578), but a private can not discharge these functions. The Compounder of Medicine corresponds to our Dispensing Steward, and may be the wardmaster himself or some non-commissioned officer acting under him. The Steward is a non-commissioned officer discharging under the quartermaster such duties as the medical officer in charge may direct, especially in relation to property, and corresponds somewhat to our Quartermaster-Sergeant. All these men are sergeants and are spoken to as such, but with reference to their duties they are spoken of as the Wardmaster, the Steward, etc.

Station [Post] Hospitals.—These are subject to the authority of the commanding officer, but their internal administration is under the medical officer in charge subject to the control and supervision of the Principal Medical Officer, who thus has a more direct power than our Medical Director.

No hospital structure is built or equipped by the Medical Department, and the medical officer in charge acts only as the custodian of the property for other branches of the service. The buildings, fixtures and enclosures belong to the Royal Engineers, and the contents, except the surgical appliances, medicines and records, belong to the Ordnance and the Army Service Corps as represented by the officer in charge of barracks. This ownership includes even such articles of ward furniture as bed-pans and medicine mugs. Every room, whatever its character, has its specified equipment, of which an inventory is posted therein. These lists depend upon schedules in the regulations, and knowing in advance the use to which any particular apartment is put, one can tell just what property should be found there. Careful responsibility is exacted of the soldier in immediate charge of the room for all its contents. Frequent inspections verify the articles, and a money stoppage is made for all damage not manifestly fair wear and tear. This stoppage is assessed against the person losing or breaking the article, if he can be identified; otherwise, against the soldier in charge of the apartment, or, should he positively disprove his connection with the loss, against

the corps at large who are in the room or building. This system prevails in relation to all buildings and their contents, and to other public property in the service.

The minimum hospital establishment is one non-commissioned officer as wardmaster, steward and compounder, one private as cook, and one private as ward orderly, when the sick are fifteen or less, and one for every additional ten patients. The allowance is so meagre because there is specific authority for the employment without pay of such patients as may be able for light hospital duty. One attendant may be employed as gardener when necessary. Comparatively little exterior police is required, as the most of the rough work is done by a contractor. Additional attendants are obtained from the Medical Staff Corps, if available, through the Principal Medical Officer. If such are not available and the Principal Medical Officer approve, the commanding officer may be asked for a temporary orderly from the troops. Only in case of emergency may the commanding officer be first applied to. No extra pay is allowed these men unless their employment is sanctioned by the Principal Medical Officer and approved by the Director General. Such untrained men may never have charge of the seriously ill, and they must be sent back as soon as they can be spared. This possible assistance by the line, whose necessity has been shown by experience, although debarred our Medical Department by law, is specifically permitted by their regulations. Under severe stress there can be no doubt the higher law of our necessity will override the statute.

HOSPITAL ADMINISTRATION.

The medical officer in charge is responsible for all its duties and is the accounting officer to the other corps for its buildings, equipment, stores and supplies. The quartermaster, or in his absence the non-commissioned officer who is the steward, is responsible to the medical officer for their care and custody and for all the other public property except the records. On questions referring purely to stores or equipments, the medical officer corresponds directly with the officer in charge of barracks (comparable to our quartermaster). He inspects monthly or oftener all equipment or

stores as to their condition and to verify inventories; at the end of the month he examines the steward's stores and books, checks the consumable balances and utilizes the accumulation. In the absence of a Royal Engineer, or where delay would be detrimental, he orders repairs by the contractor or other civilian, and notifies the engineer officer. He supervises all the sick in the hospital and the expenditure of all medicines, diets and extras, and he divides the professional duties between himself and the other medical officers, retaining for himself a proportional number of cases unless excused by the Director-General. All soldiers proposed for invaliding (that is, for discharge for disability, or for transfer to England as invalids) are placed in his care. He refers to the Principal Medical Officer all matters he can not decide as to the care of the sick or the management of the hospital. He is required to visit the hospital at home stations at 9 a. m. in summer and 10 a. m. in winter, between 5 and 8 p. m., and oftener when necessary. Abroad as the climate may indicate.

ATTACHED MEDICAL OFFICERS.

They are responsible to the medical officer in charge for the professional care and the military discipline of the wards that he has assigned to them. They draw his attention to all serious and important cases and to the patients they think fit for duty. They report by certificate changes in diagnosis, carefully instruct the ward orderlies in hospital duties, and attend such drills and parades of the Medical Staff Corps as ordered. Each ward officer keeps a Diary or Ward Book and a Medical Case Book. The Ward Book contains all the prescriptions legibly written, with specific directions in English for their administration. In the Case Book are entered the medical particulars, from notes taken in the ward, of all important cases. Neither book may be left in the ward nor be accessible to the patients. The medical officer signs the first and last entries, and on transferring a case he also states to whom and when it is transferred. All extras and diet drinks are entered in the Case Book with the daily amount and the reason for the issue, for the information of the officer in charge.

ORDERLY MEDICAL OFFICER [Medical Officer of the Day].

One of the attached officers is ordinarily detailed by roster. He is on duty for twenty-four hours, and remains at his post until relieved by his successor, except when absent on duty or at his meals, when he leaves written directions as to where he may be found. He inspects the stores received, sees that the food is properly cooked, inspects the kitchen after the evening meal, makes regular rounds of all the wards, investigates reports and complaints, inspects the medical staff corps barrack rooms in the morning, receives the report of the detachment at tattoo, inspects men discharged or "detained" before they leave the hospital, and performs all necessary and emergency duty toward the sick in the absence of the officers in immediate charge.

ADMISSION AND DISCHARGE [RETURN TO DUTY] OF MEN.

All soldiers marked for hospital at medical inspection are conducted thither, bearing their kits, by the Sick Orderly Non-Commissioned Officer, who takes with him the duplicate company sick reports. As soon as possible the medical officer in charge examines these men, definitely determines their diseases, and assigns them to wards either actually or through the wardmaster. At the larger stations the double examination and the greater number of men considerably delay their final disposition. At the smaller stations, where the medical inspection occurs at the hospital, as our own sick call, the process is simplified and shortened. The station medical officer [post surgeon] may think that a man does not require admission to hospital, when he may return him to his company at once; or he may believe that he requires a day's rest and excuse from duty, or that a few hours' observation is necessary, so in either case he is "detained"; or that he should be immediately "admitted." Whatever decision is reached is noted accordingly in ink on both sick reports. One sick report is sent back to the corps with the non-commissioned officer, either at once or at noon, as the size of the command determines, and the other is retained as an office record. The "detained" men are again examined in the evening, and should their admission be thought necessary the officer commanding their corps

is immediately notified in writing, and they are placed on hospital diet the next day. Should they be found not sick, they are returned with the discharged men.

Upon admission the soldier's kit, including his entire uniform (except the forage cap of warrant [non-commissioned staff] officers only) is taken in charge by the Pack-Store [Knapsack Room] Keeper, who must be a non-commissioned officer, and the items are formally entered in a check book. The keeper makes duplicate inventories of every article, and indicates by a letter whether it is New, Good, Worn or Bad. The duplicate is signed by the keeper and endorsed by the patient, or by the ward orderly for him, and the number of the check is attached to the kit. All valuables are turned over to the Quartermaster. The keeper selects out the soiled linen and has it washed at public expense. He brushes and cleans the various kits, and properly arranges and cares for them while the men are in hospital. When they go out, they present the duplicate and sign the counter-foil.

On admission the patient is given a bath if possible, and the following articles, known as his personal equipment in hospital, are issued to him, and he is held responsible for their condition: One pillow-case and two sheets, and one each of the following: Quart soup basin (bowl), board for bed-head ticket, bread crock (covered earthen jar), hair-brush, comb, fork, knife, pint earthen drinking mug, plate, butter pot, chamber pot, tablespoon, towel, and cap, gown of blue serge, cotton handkerchief, cotton shirt, flannel shirts as needed, pair socks, pair slippers, blue serge trousers, blue serge waist-coat (jacket), and if necessary, one small basin for sores, earthen cup for spitting, ophthalmic napkin, urinal, and chevrons. While in hospital the men are required to wear the uniform just noted, which is a conspicuous and ill-fitting bright blue with a scarlet neck-tie. It is a very vivid dress and effectually prevents straying from the grounds unobserved. The non-commissioned officers are given red chevrons. While confined to bed these are placed over the bed-ticket. These articles are receipted for by each man, or by the ward orderly if he is too ill, and they must be returned in good condition on his departure.

When regularly taken on the books as "admitted," usually the next morning, the man is required to go to bed regardless of the character of his disability. This is not a regulation but at certain large hospitals it is a rule having the same force, and it may be looked upon as a custom of the service. He is also then placed on milk diet, which consists of 12 ozs. bread, 3 pts. milk, 2 ozs. rice, 1 oz. sugar per diem. Immediately upon assignment to a bed each patient has a diet sheet on a board hung over the bed's head. All diets, extras, or drinks are entered on this sheet by the prescribing medical officer previous to their actual issue. Ordinary diets are entered for the succeeding day, but extras and drinks for the day of issue.

But soda water, lemonade and calves-foot jelly, before they can be issued require the approval of the officer in charge. This is true of general hospitals as well, where the division officers also must approve, and it is a curious illustration of the minor economies that frequently produce neutralizing delay. The first issue of a diet is written in full, and subsequent issues of the same diet are marked by its initial; all columns in which no entries have been made have lines drawn through them; the quantities of extras must be written, not entered in figures, and all alterations must be initialed.

The date of discharge (to duty) must be filled in by the prescribing officer, who also signs the sheet when it is completed. The extras are also entered in the case book for the information of the Principal Medical Officer. The prescribing officer is directly responsible for and may be called upon to justify the necessity for all the articles ordered. The medical officers specify on the diet sheets the hours during which the patients are allowed out of bed, and also whether they may be employed on light hospital duty.

DISCHARGE [RETURN TO DUTY] FROM HOSPITAL.

At each morning visit the officers designate the men fit for duty the next day. These are then inspected by the medical officer in charge, and if passed by him their names are entered on the back of the company sick reports, where there is a form for the purpose, which is returned to the company, usually at noon. The next day these men cleanse the utensils and the bedsteads they have used,

turn in their personal hospital equipment, and receive back their regimental clothing and kit. They are conducted to their commands after the evening meal by an orderly non-commissioned officer from the regiment.

The hospital admissions and demissions as just described are marked with a deliberation that at first view appears needless and that certainly presents nothing for our imitation. The celerity of the original inspection is counterbalanced by the second examination, which is superfluous if the first is meant for more than a rough indication; and the conditions of "detention" and "attending" are the equivalents of our quarters, with somewhat greater inconvenience to all concerned and without the soldier appearing on the permanent medical records either nominally or numerically. The soldier upon his return from hospital passes at once to a status of duty with no intervening convalescence or probation in quarters. There must be no doubt of his recovery, so the second day is in part one of observation. The real key to the whole system is the importance of keeping the hospital and the company ration accounts distinct and unbroken. With no interchangeable ration system like our own, and with stoppage charges to be carefully accounted for at every turn, the actual ration in kind is sent to the hospital from the company for the first day and the Medical Department becomes responsible for the soldier's subsistence only on the second day of his residence, which officially is the first of his admission. The clinical and the pecuniary records are thus made to correspond. In the field, as will be seen later, the whole matter is greatly simplified.

HOSPITAL EQUIPMENT.

The ward equipment is specifically arranged by an official and unvarying schedule, that can not be detailed in this abridgment. It contains some articles in character and number hardly to be anticipated from our customs. For instance, a ward of between 20 and 30 beds has shaving-brushes, shaving-bowls, and shoe-brushes, two each; it has two wash-basins, six tumblers, two arm-chairs, but no common chairs. The ordinary seats are "forms," very heavy wooden benches with iron legs and no backs. A ward of this size has three

"soldiers' tables." These are of very heavy plank on trestles, and are used indifferently to hold medicines or dressings, or for meals. The bedsteads usually have a sacking bottom. The bedside tables are of various patterns: one excellent kind has a heavy glass or marble top with a shelf beneath. Two "loading irons" are supplied each ward. These are heavy iron weights arranged to pass over the handle of a long-handled scrubbing-brush, so as to increase the pressure and facilitate the work. This is an admirable device.

It is to be remembered that none of the ward furniture, not even a glass measure nor a pewter egg-cup, is medical property. It is receipted for by the hospital quartermaster, on behalf of the senior medical officer, who is the accounting officer, to the officer in charge of barracks. An abstract of inventories is signed by both of these officers and a copy is retained by each, and the officer in actual custody may have a triplicate if he desires it.

The inventory for each ward is hung up in it, signed by the officer in charge of barracks. Should it be absolutely necessary to alter the number of articles in any particular room he is to have due notice, that he may change the inventory. No one else may alter it.

A dining room, used only for dinner, is found in a few of the larger hospitals. In these breakfast and supper and in others all the meals are eaten in the ward at the tables just described or in bed, as the case may be. The ward orderlies bring the food from the kitchen and cleanse the utensils afterward. When patients go to the dining room they carry with them their plates, bowls and other table furniture. The daily bread allowance is issued individually and is supposed to be preserved in the crocks. As it dries there, it is usually kept elsewhere, and I have observed the day's issues for a ward lying in it in a tray covered by a towel. To supply each soldier with his day's allowance of bread seems inconvenient and wasteful; for while the average quantity may be sufficient, the supply and the appetite are not always in accord. It is a part of the method of individual instead of general allowance and charge.

AIR-SPACE.

The minimum cubic space for each bed in permanent hospitals is 1,200 feet at home or at temperate stations. For detached wooden

huts (pavillions) 600 cubic feet. The average air-space for each man for each month in the year is to be reported.

EXPENSES OF PATIENTS.

More than twenty classes or conditions of patients are recognized in the regulations, and against the most of them stoppages varying in amount are made. It is sufficient here to say that all soldiers in hospital on account of wounds received in action or illness contracted in the field, are treated free. In general terms all other soldiers undergo a stoppage of 7d a day to cover their hospital expenses. Those under treatment for sickness resulting from their own offences lose their entire pay. Delirium tremens and venereal diseases are not regarded as the result of offences, in this sense. Soldiers admitted for injuries received in the line of duty from circumstances beyond their control, may have their stoppages remitted by the Secretary for War, but if not in the field they fall under the general rule. The medical officer makes out the stoppage returns from the Admission and Discharge Book [Hospital Register] and sends them to the soldier's commanding officer. His acknowledgment of their correctness is pasted on the Diet Account, of which later, with which it must agree. The hospital stoppage includes payment for washing the soiled clothes the soldier brings with him to the hospital and that of the public property he uses there. The personal clothing is usually washed by a company woman, and the hospital clothing and bedding by the contractor. The Army Service Corps pays for the whole. The man has no direct personal responsibility, and there is nothing corresponding to our Hospital Matrons. No patient is allowed to receive pay while in hospital, nor to retain money or other valuables in his possession. The man's accumulated pay is given to him on rejoining his company, and his valuables are returned to him by the quartermaster on leaving the hospital. But at stated intervals, generally weekly, the men are supplied from the company with small amounts of tobacco, stationery and postage stamps, should their use be permitted by the medical officer. These are charged against the pay that is accumulating for them while sick.

CONFINEMENT.

At the larger posts are wards for sick soldiers awaiting trial and for those not controllable by ordinary hospital methods, which are under charge of a detachment of the guard, not of the medical staff corps. The guard is responsible for their custody, while the medical officer is responsible for their treatment. The larger hospitals contain apartments constructed for the proper keeping of violent lunatics. In the absence of such rooms the only restraint permitted is by the strait waistcoat, belt or sheet, in order to prevent injury.

ADMISSION FOR INJURY.

Whenever a soldier is admitted to hospital for an injury, whether received on or off duty, except wounds in action, the medical officer at once notifies the man's corps [regimental] commander who convenes a Court of Inquiry to investigate the circumstances. The court gives no opinion, but the soldier's commanding officer records his opinion on the evidence. The proceedings are sent to the commanding general for confirmation, and are transmitted to the medical officer to note on "the man's medical history sheet the fact that the court has been held, and the opinion as to the effect of the injury on the man's service. Finally the proceedings will be attached to the man's original attestation [enlistment paper], a copy being attached to the duplicate." (Q. R. I. VI. 122.) The probable object of this care is to settle beyond doubt at the time of its occurrence the conditions that led to the injury.

It is interesting to note in passing that, while any commanding officer may assemble a Court of Inquiry to assist him in reaching a conclusion, no court may give an opinion on any point involving the conduct of an officer or a soldier. (Q. R. I. VI. 118.)

DANGEROUS AND FATAL CASES.

When a patient in hospital becomes dangerously ill, or a fatal result is apprehended, the medical officer in charge at once sends full particulars to the commanding officer of the man's corps, that his friends may be communicated with without delay. He also informs the Chaplain of the man's denomination. Immediately after the death of a soldier the commanding officer causes a report of the cir-

cumstances to be made to the man's next of kin, as shown in his Pocket Ledger, which is required to be duly corrected every first of January. This humane and reasonable course is directly opposed to our own practice, and is highly commendable. To balance a possible pension claim against the relief that such information gives to those in distress is inhuman; and to suppose that a full statement of the truth when the facts are fresh will assist or tempt to fraudulent claims is short-sighted and narrow. Further, if there is a probable claim, it should be the duty of the Government to supply such facts in support of it as may be exclusively in its own possession. It would appear more logical that the information in relation to illness and death in hospital should be supplied directly by the Medical Department, rather than at second hand by the regimental commander.

DEATHS.

The death of a man in hospital is at once reported to the commander of his corps and of the station, with a notice of the date and hour after which the interment may occur. The general or other commanding officer is required at once to communicate the fullest particulars of an officer's death to his nearest relation, and to follow the same course should a fatal result to his illness be apprehended.

SUBSISTENCE IN HOSPITAL.

The soldier's ration for the first day is carried with him or is sent after him from the company, uncooked if possible, and only in an emergency is he supplied from the hospital on that day. Should it be necessary, however, parts of certain specified "extras" may be issued to him. For this special purpose bread, which is not an extra, is thus regarded. After this first day the patient is placed "on diet," as it is technically known. To be "on diet" does not mean, as one might suppose, to be "dieted" in the professional sense, although the condition is much the same, but to be fed at the hospital expense. For the sake of perspicuity, although anticipating what must be repeated in another section, it is to be noted that the soldier's ration when with the company in the United Kingdom, as supplied by the Government, is one pound of bread and three-fourths of a pound of uncooked meat. All in addition, as groceries and vegetables, are purchased at the

expense of the soldier himself by a formal stoppage against his nominal pay. For patients in hospital no rations as such are drawn regularly, but food is supplied according to various "diets," for which a uniform stoppage is made against each patient to cover the entire hospital expenses of all. Diets, as standards by which selected food may be distributed to groups of sick or convalescents, are a device probably common to all hospitals, civil and military. The British army uses seven, known as Tea, Milk, Beef-Tea, Chicken, Convalescent, Roast, and Varied. Each is formulated with exactness, and parts of two diets may not be ordered together. The Tea Diet is: Bread 12 oz., Tea 1-2 oz., Sugar 2 1-2 oz., Milk 6 oz. The Varied Diet is: Beef or Mutton, 12 oz. without, or 15 oz. with bone, Bread 18 oz., Tea 1-2 oz., Sugar 1 1-2 oz., Milk 6 oz., Butter 1 oz., Potatoes 16 oz., Vegetables, 4 oz., with salt, pepper and mustard, and optionally wine, spirits, malt liquors, and diet drinks may be ordered. These diets represent the extremities of the scale through which the others run. The ordinary drinks allowed for patients are: Barley Water, Rice Water, Gruel, and Lemonade, each prepared by formula. The regulations take cognizance of "extras" and "medical comforts," whose exact definition is difficult. Extras may be described as articles of food and stimulant authorized by the Allowance Regulations to be given under certain conditions in addition to the recognized hospital diets. Medical comforts are articles of similar character procured and used somewhat differently. The same article may be a part of the regular diet, an extra, or a medical comfort, according to the circumstances of the case. As a class, the medical comforts closely resemble our hospital stores. It has been suggested that the medical comforts are relics of the regimental hospital system, as illustrated by the boxes of them shipped to hospitals on active service.

The system of food supply and accountability will be described later.

This subject of feeding the sick is so important that I introduce for the convenient comparison of our own officers an abstract of the official scale promulgated for our guidance. In the United States military hospitals the sick have either Full Diet or such articles of Special Diet as the medical officer may in his discretion select. The

Full Diet schedule prepares a bill of fare for every day in the week, that insures abundance and variety. The week's range covers twenty-seven articles for whose preparation recipes are given, besides bread and cheese, and the amount supplied one day with another is the same, although the items vary. To take Thursday as an example, the list is: Breakfast, Coffee or Tea, Bread, wheat or corn, Hominy with gravy, Bacon, fried; Dinner, Beef or Mutton roast, Bread, Potatoes, Vegetables, canned or fresh; Supper, Tea, Milk-toast, cold meat, stewed fruit. The quantities of these are, for twelve men, Coffee, roasted, 12 oz., with milk and sugar to taste; Hominy, 16 oz., Bacon 3 lbs., Beef or Mutton, 16 lbs., Potatoes, 8 lbs., Milk-toast, bread 4 lbs., milk 3 pts., Butter 3 oz., Stewed fruit, dried fruit 18 oz., Sugar 3 oz., Vegetables and cold meat, no formal limit. Special Diet embraces too long a catalogue to enumerate. The separate items or any combination of them may be selected. A few examples will illustrate: For twelve men, beefsteak, 6 lbs., Stewed oysters, 1 qt., milk, 1 qt.; Broiled ham, 4 lbs., Mutton broth, mutton 6 lbs., salt, rice, each 2 oz.; Macaroni, 1 lb., etc., etc. The money value of such parts of the soldier's ration as the medical officer does not choose to use in kind serves, with us, to procure the other articles, which are supplemented by a few "hospital stores" that nearly accord with the "medical comforts." The medical officer draws the rations from the Subsistence Department, disposes to the government or elsewhere the parts not needed, uses the cash proceeds to purchase other food, and takes up the whole on a debit and credit account for the hospital as a unit, with no reference to the individual soldier. In the British service each man must have an individual account kept with him, and the accounting officer, not of the Medical Department, verifies by a minute scrutiny of each diet ordered the accuracy of the whole.

HOSPITAL BOOKS AND PAPERS.

A soldier appears on the hospital books from the date of his formal admission, usually the morning after his actual arrival, so that the ration returns and the other records may correspond in time. The wardmaster is in charge of the Admission and Discharge Book, which corresponds to our Register, and makes in it entries as follows:

Number of the case; (the numbers are continuous for the calendar year, a new No. 1 appearing every January); Regiment; Company; Regimental number; (as explained elsewhere, the regimental number is the soldier's permanent numerical designation); Rank and Name, surname first, and station whence he came, (should he be married M is written under the name); Completed years of age (at last birthday) and of service; Dates of admission and discharge from hospital; Disease, (primary, secondary and operation); Died or recovered (in case of death DIED is written in capitals and enclosed by a black line. R is used for recovered); when discharged from hospital; the state of health (healthy or otherwise), and destination; the ward in which treated; observations (in all instances the No. and folio of the Case Book). Then follow twelve columns under the general heading of number of days liable for hospital stoppages, grouped into three sets of four months each, in which to note for the first, second, third and fourth months the number of days' ordinary stoppages, stoppage of whole pay under certain conditions, and for medical comforts; and a final column of the total number of days on diet or receiving extras. All referring to the pecuniary relations of the soldier to the service has no interest for us, except abstractly. An interchangeable ration would abolish the whole of it. Our column for "disposition" would embrace the four following "disease." I am not sure whether an index is required. Separate Admission and Discharge Books or parts thereof are kept for Regular troops, Auxiliaries and Pensioners, Seamen and Marines, Officers, and Women and Children, and spaces are left between the yearly records.

HOSPITAL PAPERS RELATING TO AND ACCOUNTING FOR FOOD.

The senior medical officer obtains all his diets, extras and comforts on requisition forms from the Supply Officer (Army Service Corps) or directly from the contractor. After the ward officers enter the diets for the next day, the wardmaster collects the sheets and sends them to the steward who prepares a Diet Account. This is a duplicate paper, of which one copy is in greater detail than the other. On the store copy, retained as a hospital record, the steward enters day by day the number and description of all diets ordered.

All food supplies received and issued are also entered on it, and one of its objects is to enable the provision accounts to be verified at any moment. It consists of twelve folio sheets arranged so that each article may balance as well as the totals, and showing not only the diets ordered but the stoppages on their account under six headings for each company, with three for free diets. The stoppage entries occupy the first page at the rate of a line to each company or detachment, and the receipts and issues and their abstract take up the remainder of the form. On the other, or War Office copy, the total but not the daily receipts and issues are entered at the end of each month, or more frequently if desired. When the daily diets have been entered, the steward prepares a Provision Ticket, and gives it and the Store or Hospital copy of the Diet Account and the Diet Sheets to the wardmaster. The Provision Ticket embraces all the diets for each ward, and by it the wardmaster checks the diets and extras that have been entered on the Diet Account. The next day he presents the Diet Account to the medical officer in charge, for his signature to the totals of food issued. This signature is a daily verification of the issues of the preceding day, and to be absolute the signing officer must examine each day the diet sheet of every patient, a process of much time and labor that I have observed carried out. As soon as the Diet Account has been checked, the wardmaster gives to the cook the Provision Ticket, which is at once authority for him to receive the supplies and the guide for the proper distribution of the diets. But the wardmaster and not the cook receives from the store-room the wine, spirits, and malt liquors ordered. He gives these to the Nursing Sisters, or in their absence becomes himself responsible for their proper distribution. The cook presents the Provision Ticket at the Provision Store (an apartment within the hospital), weighs the articles in the presence of the issuer and of one or two patients, and enters the quantities on a slate. At the end of each month the medical officer in charge forwards the original diet sheets and the Return of Extras to the Principal Medical Officer. In no instance, notwithstanding the original may be defaced, many copies be sent. Having examined these diet and extra diet sheets, the Principal Medical Officer transmits them to the Officer in Charge of

Supplies for that District. At the same time the War Office copy of the Diet Account, having been filled and certified by the medical officer at the end of the month as correct, is transmitted by him to the Supply Officer. As the various requisitions are already in that officer's hands, he then compares the three sets and the contractor's bills, and certifies to the correctness of the computation, and to their agreement with the contractor's bills and with each other, and the account goes forward to the War Office.

Under this system food in bulk is easily obtained for the hospital, but no more easily than by our own way. The method of accountability is so difficult, in the absence of a supply of elaborate blanks, and under any circumstances is so complicated and troublesome, as to offer nothing for our imitation.

MEDICAL HISTORY SHEET.

This is a paper prepared for each man at the time of his enlistment and arranged thus: Upon one side are the man's surname and Christian name; the date and place of enlistment; the parish and county of birth; age at last birthday; former trade; height; weight; chest measurement; physical development; small-pox marks; vaccination marks (arm and number); when vaccinated; and marks on body; the name of the medical officer who finally approved the recruit; date of examination and condition for re-engagement (for a medical officer's future signature); particulars of re-vaccination (for signature); the corps, regimental number and date on first assignment and on transfer; place, date, disease and result when he may have appeared before a medical board; and a space for general remarks as to habits, conduct, etc. In other words this is a descriptive list giving more particulars than ours, with no account of pay or clothing. The reverse of the form also carries the man's name and is ruled in thirteen perpendicular columns and twenty transverse lines for as many entries under these headings; station or troopship; date of arrival at the station or of embarkation; date of attack; dates of hospital admission and discharge, with year, month and day of each; diseases, primary and secondary; number of days in hospital, and remarks on the nature of the disease, how induced, mild or severe,

if completely recovered from, whether any particular treatment was adopted, nature of primary disease in venereal cases and whether mercury had been given, and if an accident whether it occurred on duty; and signature for each line of entries. The available space is so meagre that the barest facts only can be given, and not the particulars implied by the later headings.

These medical histories are regimental, not company papers, and are sent by the man's commanding officer to the hospital at which he would be treated immediately upon the arrival of a command at a station. The medical officer in charge of the hospital (not the man's commanding officer) sees that entries of station and date of arrival are at once made on the sheets. He also sees that every admission is immediately entered from the Admission and Discharge Book and is completed upon the termination of the case, that should the soldier not have been in hospital while at a station "no admission" is entered and duly signed, and when a command leaves a station all the sheets fully completed are returned to the commanding officer for transmission to the next hospital. While at any hospital these sheets are open for the inspection of the medical officer serving with the troops. For men "non-effective by death" he forwards the completed sheets to the Principal Medical Officer for transmission to the Director General. But for men who become non-effective through discharge, desertion or invaliding, their medical history sheets accompany their other personal documents. In the one case they are useful as vital statistics; in the other, the men surviving, they have a military value.

Our medical officers have often inquired whether such a document might not be introduced among us with advantage. Shorn of some of its descriptive detail, as a purely professional and not a military or regimental paper, transmitted by mail directly from one post surgeon to another, it might be useful to the medical officer at the man's new post. The Hospital Register supplies all the necessary local history. But as our enlistments are not necessarily continuous, and frequently follow in different organizations, its greatest value, that of a record of previous service and health, would be lost. It is conceivable that by using the Surgeon General's office in connec-

tion with the outline-card records as a clearing house, such histories might follow the men to their new commands. I do not think, in view of the clerical labor required, that the result would be commensurate with the energy expended. A medical history in the sense of a clinical abstract, to accompany a transferred patient, is quite different. But in the British service, ranging all over the world and with an enlistment practically continuous, the medical history sheet promptly supplies information often otherwise unattainable. Our careful records, concentrated at Washington, furnish every particular required there for vital statistics and for pensions.

Transfers from one hospital to another are made on formal medical certificates, corresponding to our transfer slips.

A Register of Deaths, to include all in or out of hospital, is kept at each hospital. It supplies information for the annual return. Our Necrological Record differs from that in being chiefly of value as a record to verify interments. There are other formal records relating to supplies, charges, and property accountability unnecessary to describe.

The methods of correspondence will be discussed later.

HOSPITAL REPORTS, RETURNS AND STATISTICS.

Morning State.

A Morning State of Sick [Hospital Morning Report] is furnished every day to the commanding officer, direct or through the Principal Medical Officer, according to circumstances. This is a brief military report upon a form that is arranged to be available for several uses. It is not contained in a book, but is on a separate piece of paper about the size of a half-page of cap. It gives by corps (corps is usually equivalent to regiment) the number that remained at the last report, since admitted, discharged (that is by return to duty or otherwise), died, and remaining. A space is reserved for sick officers, for their rank, name and corps, disease, when admitted, discharged, and remarks. This form is used as an immediate report to the commanding officer whenever an officer is taken on or off the sick report. I do not understand that these details about officers are entered on the daily states. The lower part of the same blank con-

tains a form for Report of Death, on which every death as it may occur is reported at once to the commanding officer of the corps and of the station. It is ruled for regimental number, rank, name and corps, age, religion, disease, time and place of death, and period after which interment may take place. The back of the paper is used for any purpose where a nominal roll is required for communication between the hospital and the corps, and it is ruled for corps, regimental numbers, rank, names, age, dates of admission and discharge, and remarks. This multiple form is one of general utility, and in its nature is transitory. It is an ephemeral report, not a record. After the information has been noticed the paper itself is not specially preserved. I failed to find any book or permanent record by which the numerical condition of the hospital on any particular day could be determined at once; that is, one corresponding to our Hospital Morning Report.

Weekly Sick Return.

A Weekly Sick Return is made from every station Hospital at home to the Director General and to the Principal Medical Officer; abroad to the Principal Medical Officer. Abroad, separate returns are made for white and for colonial or black troops. This is a numerical return of all enlisted men, except foreign invalids, treated in hospital or in quarters. Ordinarily, warrant officers are the only enlisted men treated in quarters. The return is made up to 12 M. Friday, and represents seven complete days, regardless of the date on which the year may close. The form is a large folio, at the head of which appears the average strength for the seven days. The first page contains the English nomenclature of diseases and injuries, with nine columns as follows: Remained at last return; Admitted into hospital during the week; Transferred from other hospitals (to include those sent from other stations for invaliding); Died, In hospital and Out of hospital; Discharged, To duty and otherwise (those otherwise to be noted in the column of remarks); Transferred to other hospitals; Remaining. This page is a purely numerical report, and closely resembles the monthly form used by us some years ago. Half of the second page is taken up with the detail of regiments at the station whose sick are treated in the hospital. The regimental

names are written in, followed by troops detached (naming the place) whose sick are treated there, and the names of other corps (staff or administrative). When these exceed thirty, they have a line to themselves. The sick of each regiment are accounted for numerically in columns similar to those on the first page, which are preceded by one giving the average strength of the enlisted men and followed by one of the average daily sick. Remarks are required when more than thirty men of any particular regiment left or arrived at the station during the week. This report by regiments is succeeded by a recapitulation of the same figures by Arms, which are designated thus: Household Cavalry, Cavalry, Artillery, Engineers, Foot Guards, Infantry, Regimental Depot, and Garrison Staff and Departments. No decimals may be used in either of these reports, the totals of which must agree with each other and with the average strength reported on the first page. Following is the actual strength present of non-commissioned officers and men on each day of the official week, the first of which is Saturday, with the total and the average for seven days irrespective of the days the troops were present. Next are the names of the men who have died in hospital, giving the usual military data, and the cause, date and place of death, and the duration in days of the disease. This is followed by the names of men in hospital whose diseases have been changed during the week, which includes the disease for which admitted, the date of admission, the disease which has supervened, and the date on which observed. Upon the third page appear the names of men who have died out of hospital, similarly arranged. This is succeeded by a record of sick officers, embracing age, disease, dates of being placed upon and taken off the sick list, result and remarks. Following this is a form for sick women and children (including only the families of enlisted men). The strength present for women and children is given. Then for each class are the number of those who remained at the last return, since placed on sick report, died, and remaining, with a series of blank columns in which the diseases are arranged according to the nomenclature. Practically this does not include the trivial cases, such as are frequently prescribed for without material interruption of health. Sanitary notes upon the troops, their quarters, and their special diseases are required.

The more important diseases shown upon page one are to receive remarks, as are their distribution among the different corps sending sick to hospital. When there is a case of small-pox, typhus, enteric, or other infectious disease, whether among officers, soldiers, or families, the rank, name and regiment are to be reported; the barracks and other places where contracted are to be specified; and when it is in soldiers' families, the medical officer states the number of attacks and deaths during the week and whether in his opinion it is attributable to local insanitary conditions and the steps taken in the matter, and in the subsequent returns he gives the results of his recommendations. He will specifically remark on all cases of suicide or attempts thereat, stating the method, the supposed motive, the name of the individual, corps, years of service, and in attempted cases the result, as discharged to duty, invalided, discharged the service, or remaining in hospital. In suicides the coroner's verdict will be given, or if no inquest was held it will be stated. The number of nights in bed that the soldiers have is to be stated on this return by regiments. After the signature of the responsible officer follows a list of all the medical officers at the station, with the duty of each and the number of patients attended by each attached to the hospital, including the officer in charge. The officers in charge of troops and of officers and families supply the information on those subjects respectively. This is followed by a nominal return of all men, not regulars, not included above, who have been under treatment; but should there be a strength of more than thirty, or there be five sick of either class present, a formal return with such manuscript alterations as required is prepared for them. The information in relation to the strength of regiments and the number of nights in bed is sent to the medical officer by the commanding officers concerned, on prescribed forms. Should a patient be received with two diseases, he will be admitted for the more serious one; but should the second disease persist after recovery from the first, or should a new disease supervene, the termination of the original case will be noted as "discharged otherwise," and the case will be newly admitted, both on the Return and on the Admission and Discharge Book. This feature is worth imitation in the interest of accuracy. I have failed to find the odious term "cure," as applied to

the termination of a case, in either the regulations or the forms. This blank is made to fold in four, and folding into itself with the proper address printed on the fourth or outside fold it requires neither envelope nor sealing. The duplicate is sent to the Principal Medical Officer, and should errors in the original be discovered an amended copy is sent through this officer. No monthly return of sick is made.

The Weekly Return has been described in detail, because it marks the radical difference between the British system and our own. Theirs is an elaborate numerical exposition, having no reference to individuals who return to duty and accounting by name only for those otherwise disposed of and the officers. Their medical history sheets, and the proceedings of the Boards by which invalids are released from service, determine the relation of the individual's disability to the question of duty, so that the current reports may safely ignore him as long as he remains a soldier. At the best the British pension system for enlisted men discharged for disability is meagre in amount and temporary in duration. It does not, as a rule, contemplate a prolonged or an effective support. But our own pension system, large in scale and wide in embrace, is now so thoroughly interwoven with our military vital statistics that it is not probable the two can ever be separated. Our own system of medical reports is defective however in supplying for the posts practically no vital statistics. There are numerous individual items, but to understand the health of the command at any particular time all those items must be laboriously differentiated from the others. It is true they are discussed at Washington, and in peace that may be sufficient. War would be over before the present system would show how diseases as diseases, not sick men as individuals, are distributed. A brief numerical summary of diseases might be of great practical value. But my study of these British figures does not lead me to advise for our service such frequent or voluminous reports, numerical or otherwise. In view of the ease with which special reports can be had when needed, weekly accounting in this way would be for us a waste of clerical strength in preparation and utilization. Nor would the result, even with our simpler organization, be commensurate with the labor in the attempt to differentiate between regiments and arms in the same or indeed in

different garrisons. When necessary, if at all, such facts can be selected and consolidated from the reports on file in the Surgeon General's office. When very large commands are mobilized, a simple weekly report, showing gains and losses, with the vacant beds remaining, is necessary for the controlling authority. Their larger garrisons, and especially the state of their commands abroad, take the British reports out of the line of direct example for us in this particular. Nevertheless I can scarcely conceive the condition under which I should recommend such minute detail on so many points. The use of the word "discharge," as from hospital, while the man remains in the service, is confusing. To limit discharge to his demission from the army and to use "duty" to express his joining the command would be more logical. "Discharge" in this sense is applied to the hospital as it is to civil hospitals, apparently unmindful that the hospital is one of the military factors.

During an epidemic of serious disease a special return relating thereto is made weekly. Should more than one epidemic prevail, a return is made for each. These are discontinued after the interval of a week from the last admission.

The Weekly Sick Return is accompanied or followed by a Casualty Report for every death. This is not the report made to the commanding officer immediately upon the occurrence of a death. The same form is used for officers and men. It gives date, corps, station, and particular barracks, cause of death, dates of admission and of death, and place of death. This includes the original cause of admission and the changes of disease made previous to death. A short summary of the case, according to printed headings, and the post mortem appearance of the internal organs follow. Unless the relatives object, an autopsy is always required. This report is accompanied by the medical history sheet, and both are filed with the Director General.

Annual Return of Sick and Wounded.

Each station hospital also makes an elaborate Annual Return of Sick and Wounded on a blank of sixteen large pages. It gives first the average annual enlisted strength; the number constantly sick,

obtained by adding together the days under treatment of each man and dividing by 365 or 366; the average sick time of each soldier, by multiplying the average number constantly sick by the days in the year and dividing by the strength; the average duration of each case, by multiplying the average number constantly sick by the days in the year and dividing by the admissions. It then reports the following particulars: The number admitted for each disease, separately and for the sub-groups, groups, and classes of the official nomenclature; the number who died in, and out, of hospital of each disease, those remaining; the average number constantly sick; those discharged the service for disease; and those invalided. A numerical abstract for each month of average strength, admissions, died in, and out of hospital, remaining the last Friday of the month, average constantly sick, and remarks concerning large changes of strength. A return of the corps or parts of corps who have been sick in hospital. A classification of the diseases, wounds and infirmities of invalids, in quinquennial periods of age and years of service. Detail of arms of service represented by the preceding corps. A return of the strength, admissions, deaths and invaliding of men by quinquennial periods of age. The average strength of officers and the rate per thousand of their admissions and deaths, with the admissions by disease, deaths, invalids, and remaining. The same as to women and children, including in each case the class of invalids. A return showing the strength of officers, of women, and of children on the first of each month. One giving the enlisted strength, the admissions, deaths, and invaliding in each month, by years of service in the command. (For the purpose of this return the British military forces over the world are divided into eleven geographical commands.) A nominal return of deaths in hospital of enlisted men, and another of those out of hospital. A vaccination return of recruits, soldiers, women, and children, each, to show perfect pustules, modified pustules, or failures, in vaccination and revaccination from arm to arm or by preserved lymph, with totals. A classified return of operations performed and of deaths following them. A nominal return of enlisted men invalided and officers given sick leave, embracing age, years of service, period of residence, disease, period under treatment, whether

the result of this climate or of previous service elsewhere, and in the case of an officer where and for what period he has gone. The whole closes with a report under eleven headings, chiefly connected with the sanitation of the hospital and the station, but including the number of men admitted for diseases occasioned by intemperance, directly or indirectly. This paper is accompanied by a Report of Medical Transactions and a Sanitary Report by the officer in charge of the sanitary arrangements. The Transactions is a manuscript review of the professional work of the year and of the prevailing diseases, and of the bearing thereupon of the sanitary conditions. The Sanitary Report has been described.

The general remarks made in connection with the weekly sick return are applicable to the annual return, when considered in relation to our smaller army and more homogenous garrisons. The foreign return ignores the individual soldier until he becomes permanently non-effective; but we must keep him under observation whenever on the sick report, at least at fixed stations. The monthly curve of disease can be drawn in the Surgeon General's office from the data there, as indeed it would seem might be the case at the central offices abroad. And the minuteness of statistical detail demanded, while possibly open to error in any event if prepared by a clerical force occupied by current work, seems to require the supervision of a specially qualified officer, whose services might be more effective in some other direction.

NON-DIETED HOSPITALS.

At stations where less than one hundred men are quartered, or when militia are assembled where there is no military hospital, a hospital is opened for which the Medical Department does not supply the food, but the ordinary ration is drawn from the patients' companies. When necessary a few "extras" are supplied by the Medical Department and stoppages are made only for actual issues of these. If for a command of forty men these hospitals are equipped with two beds, for seventy men with three, and for ninety men with four beds, and they are administered in all respects except as to diet as ordinary hospitals. But where the command is less than forty, no hospital

equipment is supplied, the men use their barrack bedding and utensils, a regimental non-commissioned officer takes charge of the equipment, for which the commanding officer is responsible, and the attendants come from the troops.

FEMALE HOSPITALS.

A hospital for women and children is a recognized part of the larger garrisons. In its absence an available room in barracks may be allotted as such a ward, with the sanction of the Commanding and the Principal Medical Officers. The wives of non-commissioned officers (a phrase excluding warrant our non-commissioned staff officers) are invariably admitted for their first confinement if there is room, and are entitled to admission in subsequent confinements if living in wooden huts or in one room in barracks or quarters. Where hospitals are set apart for the purpose, cases of scarlet fever, small-pox and diphtheria are always admitted to limit their spread. Other infectious maladies are ordinarily treated in quarters, and no infectious case of any kind may be admitted to a hospital for parturient or general disease.

By regulation the weekly statistics are entered on the return of the station hospital in combination with all other cases, not ephemeral, in families. But at Aldershot, for some reason, the Female Hospital reports independently. Infectious diseases and deaths are specially noted. Statistically, only soldiers' wives and their children under the age of fourteen are recognized. All other members of soldiers' families, notwithstanding they may have been treated out of kindness, and officers' families are ignored. The regulations for these hospitals are omitted here.

LUNATIC HOSPITALS.

In official connection with, but locally detached from the General Hospital at Netley, is a military Lunatic Hospital under its own administration. This is a specially built and equipped institution for the accommodation of both officers and men. The Government does not assume permanent charge of its insane soldiers, but they are ultimately discharged and distributed to their respective parishes. The large station hospitals contain apartments specially designed for

the temporary care of such patients. Ordinary lunatics are turned over to the parish authorities; dangerous lunatics are sent at once to asylums devoted to the pauper insane.

GENERAL HOSPITALS.

General hospitals differ from station hospitals chiefly in their more complex administration and in their reception of invalids as well as of local sick. The senior medical officer is a Principal Medical Officer, usually with a major general's rank, who is responsible for the conduct and discipline of the whole. The Registrar [Executive Officer] prepares all returns and reports for the Principal Medical Officer; he commands the detachment Medical Staff Corps; he is responsible for the accuracy of the Admission and Discharge Book, and for all the forms and returns connected with the invalids, and he furnishes the Principal Medical Officer with a daily State of Sick. The Division Medical Officers are responsible for the groups of wards committed to them, for their order and their management, for their sanitation, and for the treatment of the sick. The assignment to wards of the medical officers belonging to their divisions rests with them. The Ward and Orderly medical officers discharge duties similar to those at station hospitals. The supervising and consulting functions of the division officers do not relieve the ward officers of direct responsibility for the sick.

At Netley, the General Hospital to which all or nearly all the invalids from abroad are sent, a staff officer is stationed who receives his orders from and represents the commanding general of the district. The arrival of all invalids and their assignment to wards are reported to him. He commands the station and troops external to the hospital, and conducts all the correspondence not medical with the corps. While he has no authority whatever over the internal order and control of the hospital, he exercises many functions that with us naturally fall upon the medical officer in command. It is a dual arrangement that offers nothing for our adoption.

FEMALE NURSES.

At the General Hospitals and at some of the station hospitals, at home and abroad, female nurses, known as Nursing Sisters, are employed. They are selected from a list of candidates by the Direc-

tor General, and are directly supervised by a Lady Superintendent or an Acting Superintendent, but all are under the instruction of the medical officers. Where they are on duty the nursing sisters are the actual nurses for all general cases and are responsible for the personal cleanliness of the patients, for the administration of everything ordered by the medical officers, for the custody in the wards of such supplies, and they have the immediate direction and instruction in nursing duties of the attendants. They do not nurse at night except under special circumstances and when two can be detailed together. No nursing sister is on duty in an infectious, venereal, or convalescent ward. When on duty they wear a uniform made conspicuous by a scarlet cape, and they may not enter their wards out of uniform, nor any other than their own at any time without authority. Their discipline seems to be good and their services to be intelligently and efficiently rendered. They go abroad for five years at a tour, according to roster. The impression that I received of this trained section of the nursing staff was very favorable. I think, however, that their usefulness in our conditions would be limited to hospitals larger than those of our peace establishment.

SUPPLIES FURNISHED BY THE MEDICAL DEPARTMENT.

The Medical Department issues only surgical instruments, appliances and materials, and medicines and medical materials.

Every medical officer below the grade of surgeon-colonel must keep himself supplied at his own expense with a pocket case of specified pattern. At the headquarters of every military district the Principal Medical Officer keeps a not very elaborate surgical equipment, for loan on requisition to the hospitals within the district. This is in the nature of a temporary and emergency supply, and one part is a bag of midwifery instruments. I did not learn how instrumental cases are delayed until the requisition is filled.

The surgical equipment list for a station hospital with 1,000 troops is copied here from a sense of the interest with which it will be read. It is: one each, corkscrew, caustic holder, set of gum elastic catheters, ear syringe, box of fracture and dislocation apparatus, filter, hone and strop, irrigator, measuring tape, operating table,

pill machine, post mortem set, scales and weights, scissors, screw-driver, spreading spatula, stomach pump, case of surgeon's instruments, urinometer apparatus, and vapor bath and cloak; two each, pot spatulas and stethoscopes; three each, bolus knives and eye-baths; four pus basins, and twelve suture pins. These are kept in good order by half-yearly requisitions. The instruments are held under lock and key.

Medicines and medical material are issued at home on half-yearly, and abroad on annual, duplicate requisitions through the Principal Medical Officer, by order of the Director General. In Ireland the Principal Medical Officer orders issues. But these and surgical materials are not to be required for on the same form, although they are accounted for on the same return. The principle by which surgical appliances are distinguished from medical material reminds one of the arbitrary gender of continental nouns. Thus, plaster spatulas are surgical and plaster skins are medical; bolus knives are surgical, bolus tiles medical; common needles surgical, packthread medical; tape surgical, pins medical; oiled silk surgical, waterproof cloth medical; flannel for fomentations surgical, surgeon's tow medical.

The official list of medicines and medical material corresponds very fairly with our list of medicines proper. Everything besides medicines and instruments and a few articles such as corks, pill boxes, vials, plasters and the like, belong to other departments than the medical. No scale of allowances is established, officers using their own judgment as to amounts; but it is enjoined that the whole list is not to be called for at one place, and that intermediate demands [special requisitions] are to be avoided as far as possible.

The requisitions are simple lists of articles wanted, and take no account of those on hand, but are accompanied by semi-annual returns upon which both medical and surgical supplies appear. Abroad the requisitions and returns are annual, and the latter are verified by Boards of Survey. The supply year abroad begins the first of April.

There is no purveying or supply department in the sense that ours is organized, and there is no effort to purchase in a cheap market as such. When the Director General approves a requisition, he sends

it to be filled by one of two or three reputable dealers, who ship the supplies direct. Freight charges are paid by the receiving medical officer with funds from the Pay Department, and the vouchers go to the Army Service Corps officer in charge of transport. A medical officer witnesses the opening of all medical supplies, and reports breakages or deficiencies, which then are investigated. Abroad, supplies are opened in the presence of a Board of Medical Officers.

The most of the medicines are furnished, as thus described, direct from the dealers, but a complete supply of medicines for one Army Corps and a large quantity for a second corps are kept in reserve at the Herbert General Hospital, Woolwich. And in order that this stock may not become old, these supplies are issued in turn to hospitals and are replenished from the dealers, so as to renew the entire supply once in two years. With an adequate system of inspection, and especially by purchasing from firms of established reputation, this simple method might, with slight modifications as to transportation, profitably be adopted for the bulk of our supplies.

No invoices nor receipts, other than the requisitions themselves, are given with the supplies. At the Medical Division of the War Office the requisition is "Approved to be supplied by....." It thus becomes an order on the dealer. When the supplies are shipped, a printed form on the back "Packed in cases....., chests....., casks....., hampers.....," is filled in, and it becomes both a bill of lading and an invoice. It goes with the supplies to the receiving officer, who signs a final certificate of receipt and correspondence, and the paper goes back to the Director General as a voucher. The combination of requisition, invoice and receipt in one paper is a marked step toward simplicity.

The return that accompanies the requisition shows the amount of each article on hand at the date of the last return, that received by each invoice, the total, the quantity expended, that remaining, and the amount required for on the accompanying duplicate requisitions. Always abroad and when necessary at home is appended the certificate of a Board of Survey that they have taken stock, that the quantity and condition of each article is as stated, and that the expenditure

has been fair and reasonable and strictly in accordance with the entries. This is a presumed check on carelessness, but it is not clear how a Board has knowledge of the nature of expenditures that are made as those in a hospital must be made. The routine appointment of a Board to vouch for an officer's certificate is not acceptable.

Medical property is transferred in detail on relief from the duty to which it pertains, stating on the return the condition of each article.

An annual report is made to the Director General on the first of October upon all medical supplies received during the year, and to substantiate the report objections to the quality will be noted from time to time. So that their source may be more readily traced, medicines from different firms are not mingled in the same receptacle. Where there is a store-room for medicines at the hospital the key is kept by the medical officer or the quartermaster, the surgery [dispensary] bottles are replenished under a medical officer's supervision, and all issues to the compounder are entered in a store book, receipted and checked. This book is kept by double entry, on the principle of debtor and creditor. The disposition of empty packages is according to a regulation like our own. Purchase of articles not on the supply list is disallowed if made without previous sanction of the Principal Medical Officer, unless under circumstances so urgent as to admit of no reference, when covering authority must be immediately sought. Disinfectants and fumigants are not furnished by the Medical Department, but through the officer in charge of barracks. Ice is not supplied by the Medical Department. Trusses are required for individually and in duplicate, and a nominal list of their issues is appended to the return made to the Director General. Each truss is expected to last three years, and if renewal is required sooner a full explanation of the circumstances is to accompany the requisition. Other prothetic apparatus is not applied for to the Director General, but to the Commissioners of Chelsea Hospital.

A few powerful and poisonous drugs, somewhat curiously selected, are kept in fluted glass bottles under lock and key. The quinine is tinted with sulphonate of rose aniline, which is innocuous and undergoes no change with acids.

The books supplied by the public are, briefly, the regulations affecting the Medical Department. No professional books are issued to hospitals, except the pharmacopeia, the optical manual, and a yearly copy of the Army Medical Report. The more permanent and larger hospitals have professional libraries and reading rooms, maintained by the officers themselves. The Government supplies no periodical medical literature to officers or to stations. Medical officers are required to procure at their own expense, and to keep in their personal possession, with their good condition and correction to date verified by stated inspections, The Queen's Regulations and Orders for the Army, Royal Warrant for Pay and Promotion, Instructions for Encampments, Manual for Military Law, Regulations for the Medical Services, Infantry Drill, and Nomenclature of Diseases.

CORRESPONDENCE.

There are certain mechanical points of difference from our own system in the correspondence of the army at large, which of course embraces that of the Medical Department. A letter is written on foolscap one-fourth of which is reserved for a margin on the left, and in the upper left hand corner is briefly noted its subject, as Medical Board, Leave of Absence. At the head of the page are the rank, name and corps from whom, and the officer or head of department to whom, it is sent. Every communication is also regularly addressed and signed. Each paragraph is numbered and enclosures are noted in the margin or are separately scheduled. All names of foreign peoples, countries and places, and in active operations all proper names, are written as nearly as may be in italic print, the letters being separate, as *Monadnock*, *Oconomowoc*, *Huachuca*. If the letter is contained on one page and there are no enclosures, a half-sheet is used, and blank fly-leaves are always removed from accompanying papers. The system of endorsement does not prevail, and all replies, remarks, or inquiries arising from an original letter or memorandum are made in the form of successive minutes. The first follows on the page where the original communication ends, and the person making it marks the original No. 1 and his own minute No. 2, in red

ink if possible. Each succeeding minute follows immediately its predecessor by date, and is numbered in sequence. A fresh half-sheet is added whenever needed, for neither the space if any between the minutes nor the margins may be used for writing. These successive half-sheets are pinned together at an upper corner, and often make a bulky and cumbrous document, whose physical integrity is somewhat precarious. In contrast to the above an exceedingly convenient form is used for minor communications, or the informal collection of immediate information, and is known as a Memorandum. This is a regularly issued army form. It is the size of a half-page of cap, the word Memorandum is printed at the top, it is divided symmetrically its whole length by a heavy black line and transversely by another a little less than one-third down. The upper sections bear the words From and To for the correspondents' names, and the right hand one is also marked Answer. Each half has a place for date below the cross line. The Memorandum makes a complete document, but is only for impromptu and local use and not for formal record.

All periodical or routine reports and returns are forwarded without letters of transmission.

The duties heretofore considered are those of executive officers. Attention is now invited to the administrative officers.

PRINCIPAL MEDICAL OFFICER [MEDICAL DIRECTOR].

A Principal Medical Officer is appointed to a District or to troops in the field, and is "on the staff of the Army." The officer at the head of a General Hospital is also a Principal Medical Officer. Colloquially, and frequently officially, this title is abbreviated into P. M. O., without disrespect being thus implied. The Principal Medical Officer is responsible to the Commanding General for all medical arrangements and sanitary duties, for the administration of the hospitals in his district, and for the distribution and discipline of his medical officers and the Medical Staff Corps, and he issues the necessary orders for hospital administration, the welfare of the sick and the internal administration of the corps. He is responsible that junior medical officers have opportunities to become acquainted with all branches of their duties. In all these respects he possesses much

more authority and is much more important officially than our Medical Director.

He makes annually to the Commanding General a confidential report of all medical officers serving under him, which is forwarded to the War Office for reference and filing. He inspects at convenient times the recruits of those corps near him, to determine the physique of the men who enter the army. He is responsible that the medical inspection of the embarking troops and of their transports is efficiently carried out, and that the ships are properly equipped with medical supplies. He exercises general sanitary supervision over all commands in his district, submitting his suggestions and recommendations to the Commanding General, and forwarding them to the Director General. He inspects in detail according to a special schedule all places where troops are quartered, once a year abroad and twice a year at home, and makes orally or in writing to the commanding and to the medical officers such recommendations upon those subjects as he may consider necessary. He inquires into the cause of any epidemic disease among troops, and recommends to the commanding officer of the station such measures of precaution as may be necessary. He reports to the Director General the occurrence of epidemic disease, whether among the troops or in the civil population, and during its continuance he furnishes a weekly memorandum. He causes any suspected water supply to be examined. He forwards to the Director General a Quarterly Sanitary Report, containing a summary of all the reports of the medical officers under his supervision, retaining the originals. This is accompanied by a Distribution Return of the Troops and of the sick, compiled from those of the medical officers, which he similarly retains.

He examines the diet and extra diet sheets when received from the hospitals of his district, and transmits them as soon as possible thereafter to the district officer in charge of supplies. In inspecting hospitals he must check irregularities or apparent waste and report them to the Director General for his action. Deviation from the authorized dietary in individual cases is permitted only when there is unusual severity or complication, and the histories of such cases are to be submitted to the Director General, at their termination, in

an abstract from the case book, to show the necessity for the course pursued. This is an excellent example of the stress laid upon minor expense out of the routine; the cases being reported for their pecuniary and not their clinical bearing.

The Principal Medical Officer obtains annually from the War Office and distributes such stationery and forms as are required for his whole district. He may contract with a civil practitioner when there is no medical officer, with the approval of the commanding general. But the approval of the Director General and of the Secretary for War are necessary should a compensation higher than the regulation be demanded.

Except for Aldershot, which is the Depot of the Corps, he is the accounting officer for clothing and equipment of the division of the Medical Staff Corps serving under him, and he keeps the books and makes the returns. At his stated inspections he minutely inspects each detachment of the Medical Staff Corps as to its efficiency, equipment and discipline. He transfers men of the Medical Staff Corps within his division.

The Principal Medical Officer refers to the Director General only questions of positive doubt or difficulty, and he invariably expresses his own opinion upon any paper sent to higher authority.

In certain large commands, as Aldershot, the Principal Medical Officer furnishes the Commanding General with a manuscript Weekly State of Sick. This is not laid down in regulations, but it supplies useful information in a convenient form. This State gives each corps, the number that remained, were admitted, discharged (from hospital, that is to say), died, remain, strength, average daily sick, percentage, and the principal diseases by groups, with the number of sick officers and the usual information concerning them.

Confidential communications are prepared by the Principal Medical Officer, and are kept in distinct files in his personal custody.

For convenience, the method of recording correspondence is considered here. Letters Sent are treated substantially as our own. Letters Received are noted in a Register. This is a large volume, where two pages facing each other are divided into eight columns of unequal width. These are headed as follows, and are used accord-

ingly: (1) Office Number; the consecutive number put upon the letter by the recipient; (2) Date of letter, by figures 13, 8, 91; (3) From whom received, as, Dir. Gen. M. D., P. M. O., A. A. G. (b), (4) No., being the office mark of the writer, as 49-M. S. C.-75; (5) Enclosures, number thereof, as 1, 4, 2; (6) Subject. This, the most important, embraces about one-half of the line that extends across the two pages. One-third of this space is given up to the briefest possible description of the purport, as Move, Transfer, Truss, and then follows the gist of the paper itself, as 7963 Pte. B. Ross to proceed to York for duty; (7) How disposed of, as O. C. Depot; (8) On what date, again by number, as 14, 8, 91. Enough lines are reserved for the proper disposition of all correspondence likely to be associated with the original, and a red line separates it from the next. In these additional lines letters written by the officer in charge of the Register are also taken cognizance of, and it thus becomes a combined record of communications received and sent.

The following is an example, the perpendicular lines indicating separate columns extending across both folios:

Office Number	Date of Letter.	From Whom Received.	No.	Enclosures.	Subject.
57	13—8—91	Dir. Gen. M.D.	{ 49 MSC 75		Move.
	14—8—91	P. M. O.			
	15—8—91	A. A. G. (b)		1	
	17—8—91	P. M. O.		1	
	22—8—91	O. C. Depot.			
Subject Continued.			How Disposed of.		On What Date.
No. 7963 P. B. Ross to proceed to York for duty Applies for Route [Transportation]. Forwards Route No. 1468 A'shot '91 Ack. Re'pt Forwards Rec'pt for Route. Depot Rec'pt filed Reports Service Completed 20 inst. Forwarded			O. C. Depot.		14—8—91
			A. A. G. (b)		14—8—91
			O. C. Depot.		17—8—91
			A. A. G. (b)		17—8—91
			D. G. M. D.		22—8—91

That represents the complete history of such a transaction as this: On 13th August, 1891, the Director General of the Medical Department ordered a certain member of the Medical Staff Corps,

in this case at Aldershot, to report at York for duty, and this order was sent by the Principal Medical Officer who received it, to the officer commanding the depot where the man then was, the day after it was issued, or presumably the day of its reception. On the same day the Principal Medical Officer applied to the proper Adjutant General, for transportation for this man. The next day the Adjutant General sends a transportation order called a route, of a specific number, with the request to have the receipt acknowledged. The original is sent to the officer commanding the depot on 17th. On 17th also the Principal Medical Officer forwards the receipt (filing the depot receipt) to the issuing Adjutant General, and on 22d the officer commanding the depot whence the soldier departed reports the service was completed 20th, which notice was forwarded the same day (22d) to the Director General. Thus a history of the entire transaction, that involves the five letters from four officers, is preserved in five lines. When properly indexed, the record is complete. Incidentally this illustrates the minuteness with which such matters are noted. A system approaching this is in vogue in some of our administrative departments; and it is desirable that a modification of it, as might easily be arranged, should supplant the bald and crude methods prevailing in our hospitals.

THE DIRECTOR GENERAL.

The Director General, selected almost invariably from the highest grade, and holding office for seven years irrespective of age, is designated the responsible Head of the Department and is charged under the Commander-in-Chief with the administration of the medical services of the army and auxiliary forces, including the Medical Staff Corps, with the supervision of the medical and sanitary duties of the army, the preparation of statistics and returns, the supply of medical stores and the preparation of estimates. He nominates for appointment the medical officers for the more important duties, as Principal Medical Officer, the Officer in Charge and sometimes the staff of General and certain Field and Station Hospitals, Hospital Ships, and Female Hospitals, the Registrar [Executive Officer] of General Hospitals, the command of the Depot Medical Staff

Corps and of the Bearer Companies, the Staff of the Training School of the Medical Staff Corps and the Staff of the Recruiting Districts. Except under very special circumstances these officers may not be removed without his sanction. He details medical officers, the Medical Staff Corps and others for duty under the Principal Medical Officers. He keeps a roster of officers on duty at home for duty abroad, but in appointing Principal Medical Officers he is vested with the amplest discretion to select for each district and command the officer he regards best suited for the peculiar duties of that particular station. Besides the advice usually given the War Department in connection with the hospital arrangements of the army, he will before an army takes the field, when required by the Commander-in-Chief, give in writing his opinion on all matters connected with the health of the troops, with special reference to the region concerned. He issues to the Principal Medical Officer of every army in active service such a code of instructions as may seem necessary for the special circumstances of each case.

As the commanding officer of the Medical Staff Corps, he issues all orders to it in his own name. He issues orders to the Medical Department by command of the Commander-in-Chief.

The functions and authority of the Director General as just sketched greatly transcend those of the Surgeon General of the United States Army, and by his seven years' tenure of office the public service escapes a succession of appointments made on the eve of retirement. The system of promotion to the higher grades in the Medical Department, which at every step offers incentive to individual development, appears efficient. Selection may always be abused, by prejudice for or against the person; but at least it gives the opportunity to place responsibility in accordance with ability. Strict seniority, which makes longevity the sole condition of succession to the more important posts, gives way to a stimulus to zeal and the encouragement of personal qualities. By restraining promotion in the lower and medium grades to seniority, moderate ambition and moderate abilities are satisfied; and then opening the higher ranks to choice presents a stimulus for exertion, and relieves the administra-

tive positions from the inertia and indifference that sometimes accompany age.

Before discussing active service, attention is invited to certain general functions of the Medical Department, such as its relation to Vaccination, Infectious Diseases, Recruiting, and the Organization and Development of the Medical Staff Corps.

VACCINATION.

Every recruit not bearing distinct marks of small-pox is vaccinated upon joining the depot of his corps, unless this has been done since enlistment or during militia service. But militia recruits need not be vaccinated unless they have no distinct marks of small-pox or of vaccination.

The militia differs from ours in being a regularly enlisted body, paid by and under orders from the central authority. For certain stated periods they are quartered with and instructed by the side of the regular troops, and transfers from them to the latter are not uncommon. The British Militia and the Volunteers are in no respect to be confused.

The vaccination is recorded on the man's medical history sheet as a part of his personal history, and on the Vaccination Register as a matter of public record. Successful vaccination or re-vaccination after entry into service need not be repeated while with the colors. But medical officers with troops inspect every March all women and children under their care, and by April 1st certify the results to the Director General. All soldiers' wives who have no distinct marks of small-pox or of vaccination are to be re-vaccinated. All soldiers' children are to be vaccinated or re-vaccinated when necessary. Vaccination Registers are kept at the station hospitals to show the results with men, women and children, and the medical officers in charge compile an annual return, with explanatory remarks, to show the results of the operations for the year, and from these the Principal Medical Officer compiles a summary for the Director General.

Direct vaccination is officially recommended in preference to the use of lymph from tubes or points, but in such arm-to-arm operation, or in re-vaccination, the lymph may not be taken from adults

nor from the products of re-vaccination. Every case of small-pox must be accounted for in the remarks in the Weekly Return of Sick, and should it be in a soldier and no vaccination mark exist, that fact, the date he joined his corps, and the depot or station through which he passed, are reported. The Vaccination Register is ruled in nineteen columns, with a multiplicity of detail not necessary to repeat in this abridgment. I saw no Register in actual use, but the form does not account for a double index, by name and organization, which is required to make it complete. Comparison with our badly arranged and imperfect Company Vaccination Book is to our disadvantage. The latter, from its want of system, soon becomes a confused medley, where occasional facts may be discovered,* but it is not a record where they may be displayed.*

SANITATION IN INFECTIOUS DISEASE.

A distinct section of the regulations is set apart for the consideration of sanitary precautions in connection with infectious disease. Such an outbreak is immediately reported to the Commanding and the Principal Medical Officers. Itch is coupled with cholera and choleraic diarrhoea as requiring barrack bedding to be used in hospital, and when no longer required the straw is burned and the bedding, the hospital clothing, and such clothing worn on admission as is not liable to injury thereby is disinfected "by such means as may be practicable." They are then steeped in boiling water and subsequently washed with soap and water.

In cholera cases such articles of the soldier's kit as cannot be steeped and washed are to be removed to the hospital, fumigated, exposed to the air and sun for a week, beaten and brushed. Special instructions in relation to cholera, embracing the ordinary provisions clearly expressed, are attached to the regulations; but they do not refer to the importance of boiling the drinking water or of using acidulated drinks.

In cases of scarlet fever, puerperal fever, small-pox, or diphtheria, the infected rooms are to be vacated, the windows opened until they are thoroughly ventilated, the furniture, floors, and painted wood-

*The Company Vaccination Book has very recently been abandoned.

work scrubbed, and the bedding, clothes, carpets, etc., thoroughly cleansed and disinfected before further use. The ceilings are to be whitewashed, the walls if papered are to be scraped and repapered, or if not papered are to be scraped and finished as before. This work is carried out under representations in writing from the medical officer attending the case to the commanding officer for a part, and from the senior medical officer to the Royal Engineers for the remainder. Barracks and quarters, the seat of infectious disease, are fumigated, ventilated, cleansed, and left unoccupied as long as may be necessary. Barrack bedding used in infectious cases before transfer to hospital, has its straw burned, and bedding and clothing not actually in use are disinfected by heat or boiling water and transferred to the officer in charge of barracks to be washed. The hair of hospital mattresses will be exposed to the air and if practicable heated to 212° , and the other hospital bedding and clothing will be disinfected by heat and chemicals, boiled, aired and washed. When boiling or dry heat is employed, chemical disinfection is regarded unnecessary. Articles that cannot be treated thus are taken to the hospital, fumigated, exposed to the air, beaten and brushed.

The materials for fumigation and disinfection, including quicklime, are furnished by the officer of the Service Corps in charge of barracks, but the work is done under the orders and supervision of a medical officer, by men attached to the hospital. The expense of cleansing quarters and rooms for reoccupation is paid by the officer in charge of barracks.

When the removal of an infectious case is necessary, application stating the nature and urgency of the case is made to the officer in charge of transport, and the conveyance is disinfected before further employment. When destruction of public or private property is absolutely necessary on sanitary grounds, the medical officer reports to the military authorities to obtain authority. But when delay involves risk or danger to the troops, he acts on his own responsibility and explains in justification afterward. I found no provision for reimbursing individuals for the necessary destruction of personal clothing. The foregoing illustrates again the minute directions supplied for official guidance.

At Aldershot, and doubtless at other large posts, there is a disinfecting furnace belonging to one of the hospitals. It is a small brick room, heated by a small thin iron furnace at one end of it, capable of developing a high temperature quickly and cheaply.

DISCHARGE FROM SERVICE.

The regulations recognize twenty-two different contingencies, with several items to each, under which men may be discharged. Except when this is under certain dishonorable conditions, every man receives a certificate of discharge and a certificate of character. Every discharge is accompanied by a waterproof envelope, in which it may be neatly and securely kept. The adoption of this inexpensive but valuable device is earnestly recommended.

INVALIDING [DISCHARGE FOR DISABILITY.]

The term "invalid" is applied to men whose discharge for disability is advised. The formality of accomplishing such discharge is Invaliding. When a man is regarded as unfit for military service by actual disability, regardless of his length of service, the medical officer in charge prepares a Detailed Medical History. This is on an elaborate form and is quite different from the Medical History Sheet previously described. It gives under nine printed headings the man's military data, including his periods of service in all parts of the world. Eight others, for whose answers nearly two pages of cap are devoted, describe the disability; treat of its origin from every point of view, including the influence upon it of intemperance, other vice, or misconduct; if a wound, all the circumstances under which it was inflicted; any defects or the results of previous injury or disease, although not connected with the disability under consideration, are to be noticed, so as to elucidate any claim that might be founded thereon; full particulars of any previous recommendation for discharge and the reason for remand to his regiment; probable effect of disability on capability of earning a livelihood; and whether the discharge is proposed for permanent unfitness, or at expiration of first term on account of present inability to re-engage.

To prepare this, the medical officer obtains from the man's commanding officer his defaulter sheet [court martial record] and records

of courts of inquiry (upon injuries) for inspection. He also prepares a Medical Report, extracted in the main from the Detailed Medical History. This is made up of seven questions and answers in relation to the proposed disability, one the most significant being, in the event its being attributed to exposure on duty, "How far it was a necessary incident of the military service from defects in housing or clothing, or from long endurance of other hostile causes to which persons in civil occupations are not ordinarily subject?" The object of this paper, which requires the approval of the Principal Medical Officer, is to guide the Commissioners of Chelsea Hospital, by whom all pensions are awarded, in their decision on the man's claim. In preparing this and the Detailed Medical History, medical officers are required to discriminate carefully between the man's unsupported statements and official evidence. Should epilepsy be alleged, there must be a certificate from a medical officer that he has actually seen the man in a true epileptic fit. It is characteristic that the company commander has no personal part in the preparation of these papers.

The medical officer in charge of the hospital must verify all the statements in the detailed history, countersign it, and become responsible for its correctness in every particular before transmitting it to the Principal Medical Officer.

The Principal Medical Officer then carefully sifts and verifies the statements in the Detailed History, and inspects the proposed invalid. Should he concur with the medical officer in charge, he advises the Commanding General that the soldier be examined by a Medical Board. On the application of the Principal Medical Officer the Commanding General causes the man to be examined by a Medical Board, the President of which if possible shall not be under the rank of a surgeon-colonel. The Board records its opinion on the third page of the Detailed Medical History, and submits its proceedings to the Principal Medical Officer (whose previously expressed opinion in favor of the discharge was a pre-requisite for the assembling of the Board). Should the Commanding General concur with the Board, the discharge is ordered. Where invalids are sent from abroad for discharge, the Detailed Medical History is sent with

them, but not the Medical Report, which is prepared where they are finally disposed of.

The special characteristic of this procedure is the extreme and apparently superfluous pains to have every step supervised and controlled. The Principal Medical Officer examines and approves the papers in the first instance, he examines the man personally and recommends his discharge, and again he reviews the action of the Board. The process seems a relic of the older time, when the executive medical officers may not have been as well trained and when under the longer enlistment the service was practically for life and offered greater temptation for prolonged and skillful malingering. There is nothing, under our shorter terms and with our medical officers, to lead to imitation in our peace establishment, or to suggest more restrictions than the disapproval that now rests with our Medical Directors. But with the improvised army that war would create, some of the inquiries as to the effect of service would be appropriate.

RECRUITING.

As is well known, the British army is maintained by voluntary enlistments. The physical conditions for acceptance as a soldier vary greatly within certain general limits for different branches of the service, and they are also changed by orders from time to time for the same corps. The medical officer is responsible for the measurement of the height, chest and weight of the recruits, and for their age being in accordance with the army schedule. At present the requirements for the mass of the army are: minimum height, 5 ft. 4 in.; weight, 115 lbs.; age, between 18 and 26 years; chest measurement, between 64 and 66 inches of height, 33 in., 66—70 inches of height, 34 in., above 70 inches, 35 in. These points will be taken up presently.

While not directly bearing upon the duties of medical officers as such, the question of maintaining a large army without compulsory service is of interest; and some of the formalities wherein the British methods differ from our own are worth study. When a candidate offers reference as to character, the Recruiting Officer uses a form of polite inquiry to the referee, asking five questions: Capacity in which

and for what time known; When last seen; Character as to sobriety, honesty and respectability; Previous service in the army, militia or navy; Married or single,—with space for answers, the paper to be returned. The man is then served with a notice by a non-commissioned officer requiring him to attend at a specified hour and place “for the purpose of appearing before a Justice to be attested for Her Majesty’s Army.” This notice explains to the recruit under eleven distinct headings the conditions of service, so far as the division of the twelve years for which he engages is concerned. Men may enlist for twenty-one years or long service; or, as generally done, for twelve years or short service. The twelve years are divided between the colors and the reserve, into 3 or 7 with the one and 9 or 5 with the other, as they elect. At the end of either period they may re-engage. He is also told on the notice that he may be discharged within three months of enlistment on the payment of not more than £10. The back of the notice contains eighteen questions to which he must reply on enlistment, and false answers to any of eight of these, as to apprenticeship, marriage, imprisonment and military service, render him liable to two years’ imprisonment with hard labor.

Upon his attestation [enlistment] which is effected by a civil magistrate, not a military officer, he signs the answers to these eighteen questions and declares they are true, and his signature is witnessed. He then takes the oath of allegiance to the crown and of obedience to Her Majesty and to “the Generals and Officers” set over him, and his signature is again witnessed. Then follows the certificate of the Justice that the questions were read to the recruit who “understands each question,” and that he has signed the declaration and the oath in his presence, giving place and date. The questions point, among other matters, to the particular parish where he would become entitled to support, if necessary, and one, “Are you willing to be vaccinated or re-vaccinated?” is at once unusually precise and recognizes a popular prejudice. A negative answer stops the enlistment. I do not suppose that at the large recruiting offices, as in the great cities, the reference as to character or the formal notice of attendance is specifically carried out, but that the applicants are taken

up for examination as expeditiously as possible. Also, of course, the physical examination and the inspection by the recruiting officer are completed before the man is brought before the magistrate for the questioning and the formal oath which completes the enlistment.

The medical officer is charged with determining that the intelligence of the recruit is sufficient and that his physical condition is sound. The chief variations from our own methods of examination are: 1. Chest measurement. To obtain this the tape is placed so that the upper edge lies immediately below and touches the shoulder-blades and the lower edge touches the upper part of the nipple, the arms hanging loosely and the surface not compressed. This position of the tape gives a larger apparent capacity than by our method. When the tape is thus applied, the recruit counts slowly from 1 to 10 and the circumference noted at 10 "is to be considered the correct chest measurement." It is also spoken of as the minimum measurement, and it is directed that the maximum expansion of the chest should also be taken and be recorded as a denominator, as 33-35. Fractions less than half an inch are not to be noted. Although both sets of figures are to be recorded, the so-called minimum is that upon which the recruit's acceptance depends. This is not reached by forcible expansion and, as just pointed out, the situation of the tape gives a larger record than with us. Chest mobility therefore plays no necessary part. It results that men are accepted who are below our standard. 2. Vision is determined by dots instead of by test-types. 3. Should the recruit present no satisfactory evidence as to age, the medical officer will decide his age and note him as "physically equivalent to" so many years and months. But the man's own statement is taken as his official age, and he is entered as such on the public documents. 4. The minimum weight, 115 lbs., is below our standard. 5. There is no minute search for and record of distinguishing marks, such as we now use to expose fraudulent enlistments and to identify deserters. A record of the more conspicuous marks only is made, as in our older fashion.

The attestation paper, which is the most important document both for the army and the man connected with the soldier, consists of four large pages and is made in duplicate. The first page is filled

with the eighteen questions and answers, the recruit's declaration and oath, and the certificate of the magistrate or attesting officer. It is the enlistment paper, properly so called. On the second page are noted under the heading Description: Age physically equivalent to (so many years and months); height; weight; chest measurement; complexion; hair; religious denomination. Marks are noted in an adjoining space. This would be the basis of a Descriptive List, although no such additional paper is prepared. Should the medical officer think the man has served before, he attaches a slip of paper to that effect, unless the man acknowledges it.

Succeeding is a certificate of medical examination, to the effect that the recruit presents none of the disqualifications enumerated in the regulations, that his vision with either eye is as required, that his heart and lungs are healthy, that he has free use of his joints and limbs, and that he declares that he is not subject to fits. Then follows the simple statement "I consider him (fit or unfit) for the Army." "Fit" and "unfit" are the simple and universally employed terms by which the qualification of the soldier is expressed at almost every point of his career. The Recruiting Officer then follows with a certificate that the recruit was inspected by him and that he considers him (fit or unfit) for the service in the (regiment or corps) and that due care has been exercised in the enlistment. Following this is the Approving Field Officer's certificate, that the attestation is correct and properly filled up and that the required forms appear to have been complied with, and "I accordingly approve and appoint him to the (regiment)." The man's destination is fixed at once.

The enlistment of men who do not agree in physique with the standard requirements is provided for on a form that gives a brief description of the man. The officer commanding forwards this, with his reasons for recommending the application, to the Adjutant General, at the Horse Guards, where it is authorized or disapproved. When authorized, that paper is attached to the attestation, and the deficiencies or other variations from the standard are thus condoned. It is my understanding that these "special" enlistments very frequently occur.

The third page of the attestation paper is arranged for a statement of services as to corps, changes in grade, dates with special reference to service not allowed to reckon for fixing the rate of pension, and that in the Reserve not allowed to reckon toward good conduct pay, each entry to be certified by an officer. This is in extension of the descriptive list idea.

The fourth page is the man's Military History Sheet. This, which is totally distinct and different from his Medical History Sheet, is arranged to show his service at home and abroad, by country and time. It notes the military school through which he passed, if a boy; certificates of education; passed Classes of Instruction; campaigns; wounded; effects of wounds; special gallantry; medals, decorations, &c.; deferred pay, issued and refunded; name and address of next of kin; particulars as to marriage, giving the woman's names, whether spinster or widow, date and place, names of officiating minister or Registrar and two witnesses, and date when placed on the married roll; particulars as to children, giving Christian name, date and place of birth, date and place of baptism and name of officiating minister. Each of these entries is certified by the initials of an officer. The entry of "next of kin," which appears on the descriptive list of our own Marine Corps as "name and address of nearest relative or friend," is a point that might be adopted on our descriptive lists, in one form or the other, with advantage to both the Government and the soldier.

All the original attestations are not sent to a central office, as might be anticipated, but are distributed among twenty groups, each of which has a distinct place of deposit, but none is sent to the headquarters of the army, the Horse Guards. Consequently there is no common place for comparison or reference. The duplicates go to the man's commanding officers and accompany them at home and abroad. All incidents affecting the man's enlistment, appointment or deprivation as to rank or pay, conviction by civil authority or court martial, and his whole service at home or abroad, are to be entered thereon as they occur. The duplicate attestations are sent at the beginning of each year to the custodians of the originals for checking, so as to preserve them in accord.

The attestation paper is practically an original enlistment paper and descriptive list combined, with the account of pay and clothing omitted. The duplicate replaces our Descriptive Book, and, in the absence of muster rolls prepared at regular intervals and containing the data that we enter upon them, the originals at these diverse headquarters serve that purpose. Each man's record is thus separate and distinct, instead of being crowded between those of others and reiterated from six to twelve times a year; or, as sometimes is the case, passing to the rolls of different companies by transfer and to different parts of the same roll by promotion or reduction. But while our own system involves much clerical labor, I failed to learn how the accuracy of this multiplicity of separate papers and their security are maintained during really active campaigns of considerable duration.

There is no second physical examination, at the depot or elsewhere.

As soon as a soldier is assigned to a corps, he is given a regimental number which is never changed. Nor in the case of death or discharge is a number once assigned bestowed upon another man. In all documents pertaining to the soldier the number invariably precedes the name. It is sometimes a convenient means of rapid identification in reports, especially in the field, as for instance in the Specification Tally Book for noting the disabled. This has lately been introduced bodily, numbers and all, into our own medical service as Diagnosis Tags, without the least explanation of the meaning of the numbers, which do not belong to our system. Should a man going into action wear his number on a metal tag suspended about his neck as a scapular, he could be determined with the aid of his regimental marks without difficulty. This I believe the Germans do. The numbers are given in sequence, authority to commence a new series being obtained as 9,999 is approached. The Royal Artillery and the Royal Engineers are extended ten and three times as many respectively. An assumed name under which a soldier may enlist cannot be erased from his papers. He may if he desire, certain formalities being accomplished, follow his assumed name by his true name as an alias.

The Medical History Sheet of a recruit is prepared by the approving medical officer at the time of examination. Only such physical marks are noted on it as have a professional interest. This goes forward with the attestation to the commanding officer of the man's corps, by whom, when the man's regimental number is inserted, it is given to the medical officer in charge of the station hospital. The details of this paper and its disposition have already been described.

At every place where recruits are examined Recruits' Registers are kept, which may not be removed from the place of examination. Registers of Recruits, a different book, are kept by officers commanding regimental, auxiliary, artillery and recruiting districts. Recruits' Registers require the particulars to be fully stated under each of the following heads, whether the recruit is found fit or unfit: Date; regiment or corps; name; apparent age, years; height, inches; weight, pounds; chest measurement over the upper part of the nipple, inches; marks of vaccination or small-pox; place of birth, subdivided into parish or county, or country if abroad, England, Ireland, Scotland, British colonies, Foreign countries; trade or occupation; state of education, subdivided into well educated, can write, can read only, cannot read; primary inspection, secondary inspection, transfers from the militia, each of the last three being divided into fit and unfit; whether previously served; remarks as to cause of rejection, and any distinctive marks; with the medical officer's signature.

An Annual Return of Recruits is furnished to the Principal Medical Officer by the medical officers in charge of recruiting. The Principal Medical Officer prepares a summary of these which he sends with the original to the Director General. I believe these are numerical, not nominal.

PHYSICAL EXAMINATION OF OFFICERS.

The responsibility for the fitness or unfitness of candidates for commissions in the army rests entirely with the Medical Boards. But they are not to reject eligible candidates for shortness of stature or other slight physical defect.

If a candidate can read Snellen's D 46 at 6 metres or 20 feet, and D 40.6 at any distance selected by himself, with each eye separately,

he will be considered fit as to vision. If he cannot read with each eye separately without glasses $D = .36$ at 6 metres, i. e. if he have not 1-6 normal vision, although he may be able to read $D = 0.6$ at some distance, he is unfit. If he can read with each eye separately $D = .36$ at 6 without glasses, but not beyond, and the defect may be corrected with glasses so that he can read $D = .6$ with one eye and at least $D = .12$ at 6 with the other, and at the same time can read $D = 0.8$ without glasses at any distance he may select, he is fit. Squint, color blindness, or morbid condition subject to aggravation or recurrence, of either eye rejects.

THE MEDICAL STAFF CORPS AND ITS DEPOT AND TRAINING SCHOOL.

Qualifications of a Recruit, and General Considerations.

As its name implies, the Medical Staff Corps is a body of soldiers exclusively instructed and commanded by the Medical Staff. Its Depot and Training School is one of the units going to make up Aldershot Camp. This camp, or more properly cantonment, constitutes District X. of the Home establishment, and contains an average force of 14,000 men of all arms, the whole being under the command of a general officer of high rank. The Depot of the Medical Staff Corps is under the direct command of a Surgeon-Lieutenant-Colonel and is as independent of other local control than that of the General Commanding the camp as any brigade within the lines. The Director General of the Medical Department is the commanding general of the Medical Staff Corps as a whole, including the Depot. The medical officer in direct command is responsible for its order and discipline, establishes his own guard, holds his own parades, inflicts summary punishment as other battalion commanders, signs discharges ordered by the commanding general, has as his adjutant a medical officer thus detailed, and a quartermaster. The men are quartered, clothed, fed, paid, drilled, disciplined and instructed in their special duties as any other body of troops. In describing the management of this depot and of the men themselves, it may be understood that, as the principles and methods applied to them are those used with the mass of the British army therefore, *mutatis*

mutandis, what is said of the Medical Staff Corps is closely applicable to the Infantry of the line.

The Medical Staff Corps is recruited from civil life, or from non-commissioned officers and privates of other organizations of the army who volunteer for transfer as privates, and who successfully pass a three months' probation at the depot of the corps if at home, or with a detachment of it if abroad. The term of enlistment, as for other troops, is twelve years, of which three or seven, at the recruit's option, are with the colors, the remainder being in the Reserve. The shorter term may be voluntarily increased by the soldier, with his commanding officer's approval; the commanding officer for this purpose being the medical officer commanding the depot at home or a Principal Medical Officer commanding a division at home or a detachment abroad. Thus a private enlisted for three years with the colors may extend it any time during that service to seven years, and when in his seventh year to twelve years with the colors. Non-commissioned officers within one month after the expiration of a year's probation, or at any time after three years, may extend to twelve years; and other soldiers enlisted for not less than six years with the colors may extend to twelve after three years' service, provided they are thoroughly efficient and possess one good conduct badge. The conditions under which men may re-engage so as to complete a period of twenty-one years' service are too diversified for repetition here. Nothing in any of these methods commends itself for our imitation, in preference to the system of uniform relatively short term enlistments.

The recruit must be able to read understandingly both print and plain manuscript, and to write; he must have a certificate of good character, and in addition to the usual physical requirements be pronounced by the medical examining officer to be in his opinion suitable for the Medical Staff Corps. He must be between 18 and 28 years of age, the limits for infantry being 18 and 26 years. As in other parts of the army, boys may be enlisted for training in the field music, or as tailors. When qualified as trumpeters, drummers or buglers, or on reaching the age of 18, they cease to be classed as boys. Boys are

also taken for training as Band Musicians in the army at large, but not in the Medical Staff Corps.

The limit of height for the Medical Staff Corps is between 63 and 65 inches, but an exceptionally good recruit who offers for that corps only, may be accepted outside of that limit with the approval of the Commander-in-Chief. The limit of height does not affect transferred men. The minimum of height for infantry is 64 inches. I am justified in saying that medical officers of experience do not regard with satisfaction the limitations of stature for these men; and it is obvious that for the conditions of our own service an under sized corps with consequent inability to handle heavy men would be unsuitable.

The other physical requirements of the recruit are those for the infantry of the line already described, except that vision need not exceed one-half the normal.

Immediately after enlistment the recruit is sent to the depot at Aldershot, where he is at once put into barracks, uniformed, and fed as other soldiers, and is carefully and persistently drilled for four months. Should a recruit after fair trial appear, from any cause, within the first three months, unlikely to become a good medical staff soldier, it is so represented, and generally speaking his discharge is ordered by the commanding general. This also applies to other branches of the service, and a discharge showing simply unfitness for any particular corps does not debar enlistment in some other part of the army. If it has been found judicious in an army whose strength is maintained with difficulty to discharge without prejudice early in his career a soldier simply unfit, and this in the interest of the government and not of the man, it is worth consideration whether it would not be expedient to adopt some such method of relieving ourselves of the helpless dead weights, incapable but not vicious, with which we are sometimes burdened.

A system of transfers between different corps is provided for by somewhat elaborate regulations, but in general terms it may be said that men of the Medical Staff Corps, if originally enlisted for the general service, may be transferred to any other corps on account of misconduct or unsuitability; but if enlisted for this corps, they can only be transferred with their own consent. This re-transfer of men

who originally enlisted for the general service and who prove unfit for the special duties, is perfectly logical and to be imitated. Upon their own application men of other branches may be transferred to the Medical Staff Corps with the consent of all the officers concerned, but they must first pass a three months' probation with the corps, and non-commissioned officers can only be received as privates. This provision for a probationary period is admirable.

ORGANIZATION.

The number in this body varies year by year with the estimates [appropriations]. At the time of my study there were 2,401 enlisted men, as follows: 8 buglers; 1,748 privates, divided into 3d, 2d, and 1st class orderlies and lance corporals; 280 corporals and lance sergeants; 213 sergeants; 80 staff sergeants, second class; 40 staff sergeants, first class; and 32 sergeants major. In addition, 15 boys between 14 and 16 years of age are enlisted for instruction; 10 as buglers and 5 as tailors. On reaching the age of 18 the buglers may be transferred as privates if they desire. Privates are advanced or reduced from one class to another at the discretion of the commanding officer, with the approval of the Principal Medical Officer; and non-commissioned officers are lanced with the approval of the Director General. The permanent non-commissioned officers are appointed by the Director General by selection, having special reference to seniority, from those with a clear military record who are qualified. The standards of qualification vary with the grade. Sergeants major are appointed after examination from first class Staff Sergeants. From the Sergeants Major are selected the Quarter-masters of the Medical Staff, who are officers with honorary rank.

The gradations are carefully and somewhat elaborately arranged, as in their other military organizations, but in the main the scheme presents a necessary proportion of non-commissioned officers with appropriate duties. These are regarded, I think justly, as absolutely essential to the proper maintenance of discipline, to which their military designations are important aids. In hospital they are assigned as compounders, wardmasters, stewards, etc., expressions which designate duties, neither grades nor ranks. The status of every

man in the corps is thus defined in relation to every other man, precisely as in other bodies of troops; and the men themselves do not suffer from the want of places to which they may aspire and by whose mutual relations the order of the whole is better supported.

We do not require the ten grades besides the boys and the buglers, but it is certainly necessary to have adequate steps between privates and the highest non-commissioned staff. Our Hospital Corps now resembles a regiment made up of privates and sergeants major. A private can hope for no promotion until he has acquired competent proficiency to discharge and superintend the gravest and most important duties that fall to enlisted men, and when thus qualified and advanced he is thereby lifted out of the performance of subordinate service. There is but one intermediate position, and that without actual rank,* in which to test a man's capability to control others, and especially to offer encouragement by gradual progress. Our crude organization requires re-arrangement to embrace two classes of privates as in our Engineers and Ordnance, and the appointment of corporals and sergeants, with lance appointments for emergency and probation. Efficiency, to say nothing of symmetry, requires such an arrangement, and we may call this established system to witness its feasibility and its necessity.

PAY.

The pay of the Medical Staff Corps ranges according to the following schedule. To appreciate it in its proper relation it must be compared with that of the infantry of the line as a standard. An infantry private gets 1 shilling a day, and the non-commissioned officers rather less than those of the Medical Staff Corps. Extra pay for extra duty is given under certain conditions to the infantry as well as to the Medical Staff Corps, but that of the latter is higher. The Medical Staff Corps soldier gets two kinds of regular pay, regimental and corps.

*Since this was written the rather absurd grade of acting steward has been recognized as a *de facto* position.

Grade.	Daily Pay.	
	Regimental.	Corps.
Boys under 18.....	8d	_____
Buglers.....	1s 2d	_____
Buglers over 18.....	1s 2d	6d
Privates 3d class.....	1s 2d	4d
“ 2d “	1s 2d	6d
“ 1st “	1s 2d	8d
Lance corporals.....	1s 5d	8d
Corporals.....	2s 1d	8d
Lance sergeants.....	2s 4d	1s
Sergeants.....	2s 8d	1s
Staff sergeants 2d class.....	4s 3d	_____
“ “ 1st “	4s 6d	_____
Sergeants major.....	5s 6d	_____

In addition, all these men may receive extra-duty pay for extra duty; as, for instance, in charge of lunatics, in charge of infectious cases, as compounders, in charge of mortuary, on troop ship, or as drill instructors. The rates of extra pay vary from 4d to 1s 6d, but speaking generally are from 4d to 6d a day. From the pay as just stated are these regular stoppages in the Medical Staff Corps, which are substantially but not identically the same for the army at large: For groceries 3 1-2d a day, for washing 1d a day, and for hair-cutting 1d a month. Therefore, reckoning the penny at two cents and deducting the regular stoppages, it appears that while the ordinary infantry private will receive in cash about \$4.80 a month, the Medical Staff Corps private gets, according to class and exclusive of extra-duty pay, from \$8.10 to \$10.50 a month. In both cases this includes their washing and presumably their barber's accounts. The lowest grade of extra-duty pay would increase this to \$10.50 and \$12.90 respectively, while it might be higher. The non-commissioned officers receive similarly from \$12.30 to \$36.90, with a possible increase for extra duty. It is a feature common to the whole army that long and good service carries with it pecuniary reward. Good conduct badges, each of which carries an additional penny a day (60 cents a month) to privates and lance corporals are issued thus: A man clear of regi-

mental entry (for offenses) for two years gets one, after six years two, after twelve years three, after eighteen years four, and after twenty-three years five. Or, if clear fourteen years he gets five. After eighteen years' service a man with four badges may receive a good conduct medal, which entitles him to a gratuity of £5 on discharge. These badges and the benefits they carry may be forfeited by misconduct. An annuity may be awarded in connection with a meritorious service medal.

TRAINING.

The first month of the recruit's stay at Aldershot is devoted to physical training [setting up] and squad and other elementary exercises; the second to the manual of arms and to musketry; the others to special instruction by lectures and recitations in the names and uses of the ordinary appliances of the Medical Department, and in stretcher and ambulance drill and in pitching field hospitals. During the whole period he is constantly exercised in company and rudimentary battalion drill. He also goes on guard and piquet. A class in cooking is carried on at one of the large hospitals of the camp, attendance at which is voluntary, but graduation in it as a cook or a superintending cook gives opportunity of earning better pay. No instruction except in cooking is given in hospital to recruits at depot. After four months of this instruction the recruit is liable to be assigned to a station, at home or in the colonies, for duty.

It is one of the anomalies that although on duty at all other stations and on troop-ships to India, the Medical Staff Corps does not serve in that empire. Medical officers of the British and those of the Indian establishments may serve together, exercising command according to their respective rank, but the medical service in India is under entirely different regulations from that of Great Britain and the colonies, and the duty similar to that discharged by the Medical Staff Corps elsewhere is done there by natives.

A permanent party of well instructed Medical Staff Corps soldiers, averaging 125 men, is kept at the depot, and the average number of recruits constantly present is 100. These are divided into companies commanded by medical officers. Between 300 and 400

recruits pass through the depot annually, besides whom all the men transferred to foreign service from home stations, and all the men returning from foreign stations for duty at home, pass through the depot. This is to facilitate the change of dress, necessary according to climate.

All Medical Staff Corps recruits at depot are diligently taught infantry drill, and all their formal movements with or without litters, or stretchers as they are invariably called, conform to those of infantry. Careful and constant observation of the drill, which was extremely interesting from the pains and thoroughness with which it was taught, showed that the medical officers at Aldershot had brought their battalion into an admirable and enviable military state. Necessarily adjusting the movements of their stretcher bearers to those of their infantry, as we must to our own, I may say at once that I saw nothing except their zeal to recommend for our adoption, and in several particulars our own methods are simpler, the movements more quickly executed, and the exercises more diversified and better adapted to the general end in view, the speedy relief and collection of the disabled. As an article of drill equipment the knee-cap, a piece of heavy leather buckled about the knee to protect the trousers, which they use would be a convenient guard from the mud in practice.

DRILL PHRASES

As a matter of curious and passing interest, not of importance, I note a few examples where the same drill phrases have different meanings from our own, and where similar ends are reached by methods different from ours, as well as some movements that we do not use. In general terms it may be said that the British Infantry drill of 1889, although simpler than that formerly in vogue, is more involved, the movements more complicated and the commands more prolix than our own.

The salute with the hand is practically that that we have lately abandoned, except that the hand is held at the salute while marching six paces, or for other distances according to circumstances. The Guards when in fatigue dress preserve the archaic form of removing

the cap when out of doors and standing at attention; an evident survival of ancient civil manners.

When several officers are saluted in company, only the senior acknowledges it.

In slow or quick time the pace is 30 inches; the cadence in slow time, which we no longer use, is 75 to the minute, and in quick it is 120, making the distance traversed in the same time the same as ours. They also use a "stepping out" pace of 33 inches, and a "stepping short" pace 21 inches, our short step being 15 in quick and 18 in double time. The pace in double time is 33 inches and the rate 165 to the minute, against our 36 inches at 180. The side step like ours is 12 inches, except when clearing another, when it is 24 inches. In stepping back the pace is 30 inches, where we would use 15 inches.

To "stand at ease" the arms are first raised in front of the body and then brought down, when the palms strike each other smartly; the right foot is brought back six inches; the left knee is slightly bent, the arms hang loosely; the right hand is held between the left thumb and palm, the weight on the right foot. To one accustomed to silence as a military feature this loud slapping of the hands, although in unison, has a startling and not pleasant effect. At least one of the American benevolent associations that adopts a semi-military form for parade uses the same device to appeal to popular attention, but the effect is more theatrical than martial.

To "stand easy" the man may move without quitting the ground. On drill and parade the privates and corporals wear no gloves. "Turn" is applied to individuals where we would say "face." The command "wheel" is used to change the direction of a column. In forming line as a company, a space of 24 inches is given each man, and the elbow-to-elbow touch is preserved. The position of the captain is three paces in rear of the company centre, except in charging when all the officers pass to the front. The officer commanding the parade does not draw his sword, except when the battalion is to be inspected. Companies habitually form in two ranks and the odd numbers are known as the right and the even numbers as the left files. Fours are formed from a halt thus: The rear rank steps back 18 inches, and the

left file then steps 24 inches to the rear with the left foot and 24 inches to the right with the right foot, thus making a body of men with a front of one file and a depth of four ranks. They then stand "fours deep." A front of fours, or of four files, does not seem to be practiced except when the march may be by the flank after "fours deep" have been formed. Fours are formed on the direct march to the front by the rear rank stepping short 2 paces, the right files marking time 2 paces, and the left files moving into their proper places. This formation of fours deep in accordance with the infantry drill, that permits and requires compactness in large bodies with folded stretchers, economizing space, is necessarily only a marching movement; but its influence upon the single detachment is bad, in that it forces all the men to the same side of the folded stretcher, not only on the march in close order, but whenever it is carried folded. This is awkward in practice and dilatory in work, requiring one bearer to have stations on opposite sides of the stretcher as it may be open or closed.

Companies are sized toward the centre, the tallest men on the flanks.

For purposes of stretcher drill a company is taken as a unit and assembled in two ranks. The command "Form fours" places all the privates four deep, each set being a detachment. The detachments are then numbered, the centre detachment is announced, and the others are close upon it. The instructor then announces "Front rank, No. 1 bearers; Second rank, No. 2 bearers; Third rank, No. 4 bearers; Fourth rank, No. 3 bearers." The company as it stands is then numbered from right to left in sections of four detachments or sixteen privates, each a section ordinarily being the fourth of a company. The extreme right hand man of the front rank calls out One, the second Two, and so on to the fifth, who is One again. This is carried on in succession to the left by fours, so that all the detachments are embraced in sections. The senior sergeants of a company are always the right and left guides, and they receive the command of the flank sections. The other non-commissioned officers are posted in rear of the other sections and in command of them. The sections themselves are then numbered, the commander of each calling out

No. 1, No. 2, &c., in succession from right to left. The company is now ready to march on stretchers.

The regulation stretchers in use are of two patterns, the old and the new. The older pattern, which it is presumed will be gradually superseded by the other, is of stout canvas stretched between two light ash poles, that are slipped between longitudinal plaits in the canvas. They are kept apart by two iron rods, each fastened by a staple to one pole and, bent at right angles, fitting into a hole seven inches from the end of the other pole. This stretcher has a small horse-hair pillow. The canvas is 6 ft. 8 in. long, the poles 8 ft. 1 1-2 in. long, the total width 2 ft. 2 in., and the weight is 16 lbs. It has no legs, and the top, unloaded, is 1 1-2 in. from the ground.

The new pattern stretcher is made of tanned canvas, fastened to the poles by copper nails through a strip of leather. The poles are square and are kept apart by two flat, wrought-iron, jointed bars. This stretcher has four 3 in. wooden rollers, and the canvas is 5 1-2 in. from the ground. The canvas is 6 ft. long, the poles 7 ft. 9 in., the width is 1 ft. 11 in., and the weight is 32 lbs. A wedge-shaped pillow, varying from 1 1-2 to 3 1-2 inches in thickness is intended to be carried in the ambulance for use with the stretcher. Eyelet holes are let into the canvas near each end to secure the pillow by strings. In the old pattern are attached cords as lashings, and one end of the pillow is free. Each pattern of stretcher has a pair of leather shoulder slings, fitted with narrow transverse straps to secure the folded stretcher. These slings are for use with but are not attached to the stretcher.

The litter with rollers is such an improvement over the primitive device of a sheet of canvas lying on the ground, that it is in high favor. Inquiry without leading questions developed that men who had carried that stretcher in Egypt thought that its nearness to the ground, although of course much better than one not clearing the ground at all, added greatly to the strain in raising and lowering it loaded. The handles, 10 1-2 in., seem to me hardly long enough to give room for a man between them to clear the patient, especially in

carrying a large man whose toes would overhang. This would be particularly the case in the haste of the field.*

The pillow, whether loose or attached, is a superfluity not worth consideration. It is likely to be lost soon, and if not lost to become stained and disagreeably soiled in actual use. Sometimes it would be in the way, and when required, clothing or extemporized support would make an easier head-rest.

With folded stretchers the canvas is rolled around, instead of being folded upon, the poles and the slings are laid longitudinally on top, with a transverse strap at each end fastened with the buckle.

The actual drill at Aldershot is admirably executed, but in my opinion our manual and drill as a whole are swifter, simpler, and better adapted to the purpose. This abridgment offers selections for consideration. The entire British drill is not reproduced here.

At "Stand to stretchers," the detachment takes post on the left of the stretcher, close to it, and each man touching it with his right foot. No. 1 aligns his toes on the front end of the poles; No. 2 is one pace in his rear; No. 3 aligns his heels on the rear end of the poles; and No. 4 is one pace in advance of him. In procuring stretchers from a pile, the Nos. 3 carry them at a slope [shoulder] and at the command "Lower stretchers," place them on the ground quietly without moving the feet or receiving assistance. At "Lift stretchers," Nos. 1 and 3 stoop, take the stretcher by the right hand, rollers away, and raise with the arm at full length. The stretchers being open they are closed at the command "Fold up stretchers," when Nos. 2 and 4 stand fast, Nos. 1 and 3 turn to the right, kneel on the left knee, lay the slings on the ground, bend the traverse irons inward, raise the canvas that it may not fall between the poles. They then face each other, partly rise, lift the stretcher, and, supporting the poles between their thighs, rollers to the right, roll the canvas tightly around the poles to the right, and spread the slings evenly on top, a strap at each end. The strap is then passed through the loop

*Since this was written a new litter has been adopted for our service, very low, canvas six feet long, and the poles one foot shorter than the British, with only nine inches for the handles. It weighs nearly eight pounds less than the foreign stretcher, but its other bad qualities are exaggerated.

of the other sling and buckled tightly around the roll. After all this the bearers stand erect, grasping the stretchers with the right hand, and face to the front. A comparison of this with our "Open, litter," although the latter might be improved, shows our manual to be simpler and as effective.

When a quick movement is required by either flank, the somewhat elaborate command is: "The company will move to the right (or left), No. 2 (or 4) taking the stretcher," "Right (or left) turn." To resume the forward: "The company will advance—Front turn."

The commands "Lift" and "Lower" stretchers are common to two similar but distinct operations, viz., the manipulation of the closed and the open apparatus.

It is not worth while to quote at length the somewhat complicated methods by which Nos. 1 and 3 occupy exactly reversed positions in loading and unloading, or to show how No. 4, marching on the right side of the prepared litter, runs back to the left side immediately it is lowered and then runs back again to the right as soon as anything is to be done. To qualify each member of the detachment in all the duties of the bearer, the numbers are changed in one of these two ways, the men standing to stretchers: "Nos. 2 and 4, two paces left close," "Quick march," "Nos. 1 and 4 right about turn," "Detachment (or company) one pace forward—March"; "Front"; "Stand to stretchers"; "Quick march": Nos. 2 and 4 thus become Nos. 1 and 3. Or: "Nos. 1 and 2 two paces left close," "Quick march"; "Nos. 1 and 2 right about turn"; "Detachment (or company) two paces forward—March"; "Front"; "Stand to stretchers," "Quick march." The Nos. 3 and 4 thus become Nos. 1 and 2.

Whatever advantages these methods have, there is not the one of simplicity over "Change posts; March."

I repeat that the drills I witnessed were characterized by patience and painstaking, and the results were triumphs of military exactness, but I remained impressed with the waste of energy in using circuitous instead of direct methods. Our own drill is open to amendment, but not in the direction observed abroad. [The original report follows out the complete procedure.]

TO LOAD AND UNLOAD STRETCHERS WITH REDUCED NUMBERS.

When the full detachment is working, the stretcher is usually placed by the side of the patient; with reduced numbers it is placed at his head in line with his body, and he is carried over it horizontally. The usual directions are given for extemporizing seats to be used except when there is shock, when the horizontal posture must be maintained.

No provision is made for one bearer to transport an unconscious man. No instruction is given as to lifting a wounded or sick soldier into the saddle. The use of coats with rifles or poles is not taught. The rifle stretcher with slings for two bearers is not described. Rifle stretchers are prepared by tightly rolling two rifles with fixed bayonets in a rug [blanket] from the sides toward each other until a space of about 20 inches is left for the patient. This requires four bearers, each grasping the rifle tightly with both hands. In marching, the bearers on one side step off with a different foot from those on the other.

Two bearers may make a three-handed seat by the right bearer grasping the thick portion of his left forearm with his right hand, the left bearer at the same time grasping the right forearm of the right bearer with his left hand, and the right bearer grasping the left forearm of the left bearer with the left hand. The right hand of the left bearer is then placed on the left shoulder of the right bearer to form a support for the back.

AMBULANCE WAGONS.

The ambulances, or as they are officially designated, the ambulance wagons, are of two patterns. Neither of these presents any peculiarity of structure or equipment that I should recommend for adoption, excepting that of the brown or tanned canvas cover which renders them less conspicuous in the field.

Both patterns carry two patients recumbent on stretchers, two sitting up in front, and two or three sitting in rear, riding backward. One of the latter seats is reserved for an attendant, if convenient. There are no side seats and the interior is thus practically wasted for the transportation of a number who might sit up, did none require to

lie down. The daily use of an ambulance with a marching column appears to be seriously crippled by this omission. The front seat is reached by a ladder, which must be lashed up before the wagon starts. The rear seat is attained by a step on the tail-board. In the old pattern the driver rides the rear horse and the patients' seat is well inside the body, the stretchers with the recumbent patients passing partly under it. In the new pattern the patients in front sit beside the driver on the box, and the front of the canvas top, like a hood, is much higher than that over the body of the wagon. A back-board or gate goes across the wagon body, cutting off the recumbent patients from those riding at the rear. In the old pattern a special wagon stretcher is used, to which patients must first be transferred. In the new pattern the field stretcher is a part of the ordinary equipment. In the old pattern the front wheels are about the same height, if not actually interchangeable with the hind wheels. In the new pattern the front wheels are low and turn under. These are so low as to greatly increase the draft. The weight of the old wagon is 1,379 pounds, that of the new pattern 1,963 pounds, and the track of each is 5 ft. 2 in. Each wagon is drawn by two horses, and the animals and drivers are furnished by the Army Service Corps. The animals are presumably steady, and the drivers are soldiers, not civil teamsters liable to panic, hired by the Quartermaster's Department. In war each ambulance has two drivers and four horses.

The new ambulance has a wooden body, and a canvas cover, curtains and hood stretched over a skeleton framed roof and supported by six tubular galvanized iron standards that fit into sockets at the sides. A locker for three bushels of grain, inaccessible except through the bottom of the body, and a tank for nine and a half gallons of water, fitted with a leather tube and funnel, are under the body. A movable box is carried on each side, one for wine, the other for tools, small stores, etc. There are straps at the middle of the roof, to carry the stretcher pillows; straps on the front and hind standards, to carry four stretchers inside the wagon; and loops under the stretchers to secure rifles. Valises [knapsacks] and accoutrements are carried at the head and foot of the stretchers. A wooden partition about a foot high separates for their full length the recum-

bent patients, who lie head to the rear. This coffin-like provision appears to be primarily of aesthetic origin. As an officer explained, "I don't think I should like to lie right next to another fellow, you know, if we were wounded." The practical disadvantages of such confinement seem to be outweighed by the charm of seclusion. Patients able to sit up ride with their feet over the tailboard, resting on a support, with an apron drawn over them. These unfortunates are thus partly out of the wagon, fairly exposed to the dust and rain and so placed as to feel the most of the jolting. An apron drawn over them is a partial protection. There is also an apron for those on the front seat.

The drill for loading and unloading is adapted to the transport, but contains nothing appropriate for our needs.

In the use of country carts and general service [army] wagons, as sometimes necessary, it is provided that abundant straw be used and the stretchers placed upon it. When, as sometimes happens, the wounded must be laid directly on the straw, four bearers are required of whom No. 4 must spring into the rear of the wagon and grasp the wounded man under both shoulders, and, with the assistance of the others, lift him in. This implies that he will lie head to the front. Unloading reverses the procedure; and special stress is laid on four bearers in each case to avoid the risk of falls.

RAILWAYS.

There are special instructions for loading and unloading trains, but as the passenger carriages [cars] differ so radically from ours in their arrangement, these cannot be made to apply to our railroad transportation.

LITTERS AND CACOLETS.

By a litter is meant a folding stretcher for the transportation of recumbent wounded upon a mule. A cacolet is a folding chair into which a patient is strapped and by which he is carried in a sitting position, sideways, upon a mule. In each case a pack-saddle is necessary, upon which the litters or cacolets are hooked in pairs. The saddle weighs 46 lbs., a pair of litters 106 lbs., a pair of cacolets 56 lbs. These are designed for desert or mountain warfare, where

wheeled transportation is impracticable. In each case a counterpoise weight must be resorted to should only one side be used, and trained pack animals always are required. It is unnecessary to repeat their drill.

There is nothing to correspond to the excellent superimposed or Baily litter, and I found no reference to anything approaching our travois of the plains.

In the Netley Museum are models of local transport used in different parts of the world for the carriage of the sick. Observing there the use made in China of the bamboo for bearing heavy loads, animate and inanimate, leads me to suggest the trial of it, as embracing lightness and strength, in the construction of hand litters for field hospital use. They should be cheap, effective, and very light.

BEARER COMPANY PRACTICE.

In imitation of active service, bearer companies are exercised in the formation of collecting and dressing stations. I have not actually witnessed this drill, but it is practically as follows: Men, preferably of another corps, are sent over the field to represent wounded, each having attached to his coat a specification tally indicating a supposed wound. The bearer company is marched out in column of fours, with the dressing station party of at least two sergeants and ten privates in the rear, the ambulances, each with a corporal or private, closely following, and the service wagon next. On reaching the exercise ground the command is halted, and at "Form Dressing Station" the non-commissioned officer in charge of that party marches his men clear of the main body and of the wagons. The wagons to be left at this station wheel to the right (or left), take ground to the right (or left), form line at close interval, which brings the horses to the rear. The officers for duty here also fall out, and the station is formed thus:

DRESSING STATION.

The operating tent is taken from a general service wagon and pitched door to the front, fifteen paces in front of the centre of the line of wagons, which are faced to the rear. A pair of field panniers is placed in this tent. Two "directing" flags are posted ten paces in

front of the doorway and ten paces apart, and two others in line with these mark the flanks of the wagon line. Each ambulance from the front is required to reverse and halt opposite the space between the middle flags, without crossing that line. It is unloaded by the wagon corporal and the dressing station party, the slightly wounded assembling between the two flags on the left and the severely wounded are carried on their stretchers, between the two flags on the right, are lifted from the stretchers, and are laid on the ground. In both cases each man's arms and accoutrements are laid on the ground at his feet. The stretchers are replaced in the ambulance, which immediately returns to the collecting station. The simple expedient of extra stretchers to obviate laying the wounded on the ground, does not seem to be used. In broken ground, to require the loaded ambulance to turn completely around may lead to additional suffering without corresponding advantage. Unless the ground is very favorable, it would appear to be better for the ambulance to move to the right or left, or be unloaded while halted head on. In practice the extreme formality of position would doubtless be disregarded, and therefore some latitude should be specifically provided in drill. When all the wounded are brought in, the ambulances are retired in rear of the station, the dressing party falls in two deep in front of the tent, the company from the front halts ten paces in front of the flags, and all stand at ease. The medical officer in charge of the dressing station then examines the wounded and explains any errors that may have been made in dressing them at the front. The dressings are then removed, the tent struck, the appliances packed away, and the company marched off.

COLLECTING STATION.

Having detached the dressing station party, the company proceeds at least half a mile to the front and ground is selected for a collecting station. A halt is made and the ambulances reversed about ten paces to the rear, when the medical corporals immediately prepare them to receive the wounded by lowering the ladder and the tail-board and placing the back-board and the stretchers on the ground. (In actual practice it would seem that detachable pieces,

as ladders and back-boards, would limit the celerity and thus the efficiency of the ambulances.) The surgical havresacks and water-bottles are served out and spare stretchers are laid on one side. At the command, "The company will search for wounded," if without stretchers, surgical havresacks and water-bottles are distributed, and on reaching the men with suppositious wounds, urgent dressings are applied, and those unable to walk are brought in by one of the improvised methods. If with stretchers, the company is formed and the guides march Nos. 3 and 4, to the ambulances for stretchers, surgical havresacks and water-bottles. The stretcher is carried folded, and is placed beside the first man unable to walk who is found. While Nos. 1 and 3 prepare the stretcher, Nos. 2 and 4 attend to the wounded man. Herein the field practice differs from that of the parade ground. In the ordinary stretcher drill, Nos. 2 and 4 are given nothing to do until the patient is about to be lifted. Even here instead of hastening to the side of the wounded man as the detachment approaches him, Nos. 2 and 4 remain with the stretcher until it is placed by the patient. This may seem a small matter, but it is characteristic of much of the deliberation and formality that mark the work. It is presumed that in actual field duty this rigidity is relaxed in the interest of promptness.

The tight clothing having been loosened, the accoutrements and valise [knapsack] removed, and urgent dressings applied, the patient is placed on the stretcher and carried to the rear, Nos. 2 and 4 bearing his arms and accoutrements. As the detachment approaches the ambulance, Nos. 2 and 4 go forward at the double, lay the man's equipment outside the near hind wheel, and assist in loading. It is insisted that this operation be carried on (in the practice exercise) by the word of command exactly as prescribed, and that No. 4 gives the commands. Their No. 4, who corresponds to our No. 1, is given charge as with us is No. 1, regardless of the fact that should the bearers be reduced, both of the side bearers may be missing and that No. 3, to whom the command is not given, must always be present and be in position to observe both the wounded and the way.

As soon as the ambulance receives its full complement of wounded, it leaves for the dressing station. The wagon corporal is

responsible that previous to its departure the men's arms and accoutrements are stored in their proper places, and that the ladder is lashed in place. He goes with the ambulance to the dressing station, assists in unloading, and returns with it to the front.

The rigid adherence to the methods of the drill cannot be commended too highly or imitated too closely. As in all other forms of military instruction, it is careful repetition and unvarying uniformity that lead to perfection and to automatic work when the test of battle comes.

The bearer companies are also exercised in laying out camps for themselves and for field hospitals. This is in accordance with the general British system of encampments, not necessary to be rehearsed here. The general principle will be described in the account of field service.

REVIEW.

In parades for inspection and review, the companies are formed in column, company front, at open order; the Medical Staff Corps thirty-one yards in front of the Army Service Corps and wagons. The ambulances are in front, and the General Service and other wagons in rear, the flank wagons correctly covering the flanks of the Medical Staff Corps, and the remaining wagons distributed at equal intervals between them.

The points of difference from our methods in these minor ceremonies are sufficient to warrant notice as matters of curious interest.

When the reviewing officer arrives fifty paces in front of the centre, he is saluted by the command, "General salute! Carry swords!" (or if armed with rifles, "Present arms! Shoulder arms!") This applies to the men. The officers salute with the right hand, taking time from the commanding officer. The Transport Officer commands, "Eyes right (or left)!" as the inspecting officer approaches the Army Service Corps, and "Eyes front!" when he has passed. The bearer company takes close order after inspection at the command, "Return swords! Close order, March!" The Transport Officer repeats the command for close order, when the rear wagons move up

to their places. There appears to be no provision, either as a ceremony or in the interest of efficiency, for a formal inspection of the stretchers themselves at any time.

In marching past the bearers march by companies, followed at a convenient distance by their wagons in two or more ranks, the ambulances leading. The tail-boards of the ambulances are lowered, the wagon corporals are seated on the hind-seats facing the rear, and the directing flank of each rank of wagons correctly covers the directing flank of the company. It is prescribed that under no circumstances may the stretchers be carried by hand in marching past.

INSTRUCTION AT ALDERSHOT.

To return to the recruit: His first two months are sedulously devoted to the same military drill that is given all infantry recruits. In the last two months he is carefully taught by lectures and recitations the technical and special points of his duty. This is conducted by a medical officer in person, who intelligently and strictly carries out his duty as instructor. These instructors are selected and not accidental details. The schedule for the course embraces forty-four working days of four hours each, and these are divided into a lecture, a recitation on the previous day's lecture, stretcher and ambulance drill, practical bandaging and other first aid. Besides this the ordinary company and battalion drills are carried out, so that the recruit has about six hours' military exercises daily. The British regulations are contained in a number of volumes, and they go into the most minute detail on all subjects. Those for the Medical Department are divided into two books called Parts, which may be roughly described as for the officers and for the men. Part II, which is for the men, is taken up with an account of the duties of the various non-commissioned officers of the Medical Staff Corps, with elementary anatomy, physiology and the principles of first aid, and with the various drills peculiar to the medical soldiers. The lecturer takes up the regulations in sequence, according to a printed schedule, omitting those about sergeants, and using them as a text, elucidates the topic for the day. The book being in each man's hands, he is

able to prepare himself sufficiently to understand the general drift of the lecture in advance, and after the lecture to appreciate and retain its salient points. The lectures embrace explanations of all the instruments and of the field equipment and their uses, as well as of theoretical subjects. In like manner the drill is progressive, as laid down in the same book. The practical work of bandaging, which the men do themselves, is supervised by sergeants under the officer.

I wish to emphasize the expression of my opinion that this instruction, like all that I saw at Aldershot, was given with such intelligence and fidelity as to compel the interest and improvement of the men, and that, in turn, they acquired much of what was taught.

INFANTRY BARRACKS.

The Medical Staff Corps soldiers are quartered, like the bulk of the infantry at Aldershot, in one-story wooden pavilions or huts. (The cavalry and light artillery live in the second story of stone barracks, over their stables.) Various styles of new barracks are gradually replacing the old wooden ones, and the following account of a set of buildings for a battalion of infantry will fairly describe the arrangement of the most improved English barrack of to-day. These are of brick, two stories high, with slate roofs, and they stand north and south in column. The prevailing winds are from the southwest. Each barrack is intended for one company and is T-shaped, the cross being at the westerly end. The buildings are about sixty feet apart in their main length, and thirty-six feet at the T. The exterior dimensions are: 154 ft. 8 in. long, 23 ft. 8 in. wide in the greater length, and 46 ft. wide in the T. The walls are double, 16 inches in all. The outer wall is 4 1-2, and the inner 9 inches solid, with an intervening air-chamber of 2 1-2 inches. They are united by Jennings bonded brick, a perforated brick or heavy tile curved longitudinally. There are no cellars, and the walls rest on a concrete bed below the surface of the ground, with the earth tightly rammed against them. There are no drains immediately about the foundations. A damp-proof course of half-inch asphalt runs around the building below the floor line. There is an air-space of seven inches between the lower floor and a four-inch bed of Portland cement.

The cement rests upon six inches of brick rubbish. The floors in both stories are of Norway pine. In the upper story this is laid longitudinally over a diagonal floor, and the joints are filled with a patent waterproof glue. As this glue softens under heat, it would not be serviceable in our climate. The lower floor is single, with white lead in the seams. The height from floor to ceiling is 10 ft. 6 in. The barrack has neither porch nor veranda, and the only ingress or exit is by two single doors, both on the same side of the building, near the centre. These door-ways open into a hall from which stairs ascend. On each floor, opening out of the hall-way, is a room 12 ft. 4 in.x8 ft. 8 in.x10 ft. 6 in., for a non-commissioned officer, two in all, and in rear of these rooms are tolerably large closets for the care of extra kits, etc. There is no provision for spare arms, for tentage, for field mess equipment, nor for any company property as such in any part of this building, which is devoted to lodging purposes. In rear of the non-commissioned officer's room in the central hall, and opening each way toward the respective wings, is an ablution room on each floor. Each of these rooms is 17 ft. 6 in. long by 7 ft. 6 in. broad, by 10 ft. 6 in. high, and is designed to serve for 55 men. The floor is concrete and asphalt, laid with an inclination of 1 1-2 inches toward the outer side, where the basins, which are public property, are placed. There is an overhead tank holding 300 gallons, supplied by constant pressure, for each barrack. No bath-tubs are in this building, and there are no urinals in it or near it. Urine tubs are placed at night in the hall-way. A recess at the end of each squad-room, in a projection beyond the common line, constitutes a closet to hold brooms, mops, etc. In the older barracks these are stored under the central table.

There is no mess-room. Food is brought from the central kitchen in the vessels in which it is cooked, and it is served on a standing table in the centre of each squad room. The table utensils are washed in the room by the mess orderly, who brings water for the purpose from the kitchen. The original table furniture is supplied by the government, and through a system of strict accountability is replaced by the men as it may become lost or broken.

Each floor, except as already explained, is divided into four

dormitories of not exactly the same size. The T-room is 44 ft.x21 ft., and accommodates 16 men; the two rooms nearest the hall-way hold 13 men each; and the fourth room 12 men; or, including the sergeant, there are 55 men on each floor. The men in the squad-rooms, with all the beds occupied, have an air-space of 600 feet each. By the arrangement of the exits, the rooms become thoroughfares in proportion as they lie near the centre of the building; for the men in the more distant rooms must pass through the others on their way to and from the single exit. The men's kits are held on shelves above the bedsteads, and near the head of each a clasp is let into the wall to receive the rifle. There are no lockers, and no provision for security in the care of private property.

These sleeping rooms have windows at the average of one to every twelve feet of outer wall. They are heated and in part ventilated by fresh air, warmed by Galton's method at the back of a grate in each room and admitted through an opening in the chimney. Cold fresh air is admitted through five or six perforated bricks, or modified Sheringham valves, let into the walls near the ceiling. The air passes out in part by Boyle's extractors, one of which is connected with the flue in each chimney. These are made of numerous delicate small sheets of mica hung so as to move outward with a very light puff of air, but to close with any attempt at a reverse current. As actually placed in these quarters the proximity of the extractor to the opening for the warm fresh air may lead to a short circuit that will interfere with the general movement of air within the room; but the principle is good, and if the sheets do not become clogged with dust it should be effective. There is no ridge ventilation. As the barracks had not been occupied when these notes were made, the practical condition of the ventilation is not known.

Measured by our rules, these quarters cannot be suitably heated by radiation from the grates and by the air warmed in them. It is evident that the English dictum "we need not give ourselves any great concern about the precise degree of warmth" for healthy men, is thoroughly accepted and acted upon in these and in British barracks generally. It is possible that the men are vigorous, but they can hardly be comfortable with the air, as I believe it is, much more

moist, and colder than that standard that places the dry bulb thermometer between 53° and 65° , and the wet bulb between 58° and 61° . The standard relative humidity is below 75.

The sewerage for this group of barracks will be the separate system. The storm and ablution water will be carried off together through underground earthenware drains. The latrines, bathrooms, kitchens and other offices will be on the right (east) flank of the various blocks, and I was told that it was proposed to put in 9-inch sewer-pipe. (This appears excessive for the work to be done.) These sewers will be in straight lengths of 100 yards with man-holes and clearing rods.

OFFICERS' QUARTERS.

As incidental to the general subject and complementary to the last item, although concerning the Medical Department only indirectly, these notes of a newly-constructed building for officers' quarters may be followed. They throw light on the genius of the service. The officers of an infantry battalion are quartered in one solidly-built two-story brick building. As the mess is the centre around which the social life of the command revolves, so it is the most important feature of the quarters. A hall in the centre of the block gives entrance to an "ante-room," which is really a large parlor, and a dining room. An L in the rear centre contains a large billiard and smoking room, wash-rooms and other accessories. Still further in rear are elaborate kitchens, sculleries, pantries and servants' rooms, with wine cellars underneath.

The quarters of the Lieutenant Colonel who commands the battalion, are at one end, cut off by a dead wall, and consist of a study or office and two non-communicating rooms on the ground floor, and four non-communicating chambers in the second, or as it would be designated there, the first story. There are competent kitchen offices and several servants' rooms. At the other extremity of the block, but communicating with it by a door, are two sets of two rooms with a kitchen attached to each set on the ground floor, and on the upper floor over these are two sets of two rooms, each set having a small kitchen. The lower rooms are for the majors, and my

informant thought the upper rooms might be for the senior captains.

All the rest of the building is divided into single rooms of moderate size, one room for each captain or lieutenant. No provision is made for any married officer but the commanding officer, and no company officer has any accommodation for a guest except in his own room. The one apartment is supposed to fulfil all his needs as study, chamber and dressing-room, as well as a private parlor. As a matter of fact, a married officer will rent his own quarters in a neighboring town, and will retain his allotted room in which to change his uniform when necessary, or to sleep and dress in when as orderly officer he is obliged to spend twenty-four hours in barracks.

A 1,000-gallon tank supplies water for the building. The storm-water passes off in well-prepared underground drains, and the sewage is carried off by a separate system.

The preceding may be taken as the latest type for quartering regimental officers; but besides this, Aldershot displays all varieties of shelter. A large proportion of officers are quartered in one-story, small, single wooden structures, officially known as huts. These were originally put up for temporary purposes, and have been added to from time to time, probably at the expense of the successive occupants. Although tastefully adorned within and neatly kept without, the rooms are very small and generally inconveniently arranged, and our most temporary officers' quarters, above the grade of a dug-out, will compare favorably with them. Some of those, however, occupied by officers of rank, have gradually expanded so as to cover a good deal of surface, and to present a very prepossessing appearance in the midst of well-kept grounds. The proximity to the conveniences of the market, and the abundance of good service, make the ease of living incomparably greater under such circumstances.

MEDICAL STAFF CORPS BARRACKS.

The Medical Staff Corps is quartered, like most of the foot troops, in rows of wooden huts, which the brick buildings just described are gradually replacing. These are one-story, thinly-boarded

cabins, with asphalt roofs, standing end on to the parade. Each barrack is about 22x40x9 ft., and contains 20 men, with an average air-space of 400 cubic feet for every bed. (These figures are approximate, the original memorandum having been mislaid.) The open nature of the walls and ceiling gives free ventilation. The floors are clean but rough. The men sleep on single iron bedsteads, of which there are two patterns. The prevailing style when not in use is compressed, by the foot sliding toward the head. The mattresses are of different materials, that preferred being filled with a woody fibre resembling what we know as "excelsior." When not in use, the mattress is folded over the bolster and strapped into a roll at the head of the bed. There are no lockers, either fixed or as movable boxes, and the men's effects are folded upon a shelf above the head of the bed. For inspection, every article is laid in a specified order upon the bedstead, which is then extended its full length. In these barracks there are no closets; and there are two heavy tables in the central line of the room which serve as mess tables, the division of food being superintended by the corporals. The daily allowance of bread for each man may be kept in this room.

There is one room of entrance, namely from the company street, in the end of the barrack furthest from the parade. This is protected by a small enclosed porch, like a large storm-door, and here a urinetub is kept at night.

The latrines at Aldershot are very good, having water-carriage by a competent system of sewerage. The Supply Department furnishes soluble paper for use there, it being more economical to do that than to open out blocked pipes. These latrines, convenient of access to the company street, are habitually in good condition. The ultimate disposal of sewage at Aldershot is by irrigation on a farm. This is not directly under military control, but is managed by a contractor. There was some complaint by the townspeople, not against the system but against its mismanagement by the contractor in an effort to require too much absorption by a limited area.

CLOTHING AND EQUIPMENT.

Upon joining the depot a recruit in the Medical Staff Corps receives the following kit free: Bag, water-proof; blacking, tin of;

braces, pair; brushes, blacking, brass, cloth, polishing, and shaving; button brass; comb; cover for mess-tin; hold-all; hook, for waterproof bag; knife, table; pipe-clay; razor and case; shirts, flannel 2; soap; socks, 3 pair; sponge for pipe-clay; spoon; tin, mess; towels, 2. The total value of these is £1, 1s, 1 1-4d. To these a late order has added a Jersey, which will somewhat increase the value of the free kit. These articles must be kept up afterward at the soldier's expense. It is estimated that a careful man can do this at an annual cost of £1. This probably depends very much on the previous training of the man and upon the service required. The recruit also receives a Bible and a Prayer Book, Protestant or Roman Catholic.

The man has issued to him clothing as follows, free: ankle boots [shoes] 2 pairs yearly; forage cap, 1 yearly; great-coat and cape, 1 every five years; frock [sack or blouse], 1 yearly; frock, undress, issued only to recruits, 1; havresack, 1 every three years; helmet, 1 every five years; leggings, 1 pair until worn out, about eight years; mitts, 1 pair yearly; trousers, 1 pair yearly and 1 pair biennially (3 pair every five years); trousers, undress, 1 pair, only to recruits; tunic [dress coat] 1 every 2 years; and 1 pair of ward shoes, in place of one pair of boots [shoes], if on duty in a hospital, every 2 years. It will be observed that the "clothing" technically refers to outer clothing or uniform, and shirts and stockings go along with the cleaning kit. Drawers are not issued to foot troops. Mounted soldiers receive drawers. Clothing required to replace the allowance spoiled or worn out unduly, the soldier supplies at his own expense. It is my impression that the allowance is not sufficient. This clothing is neatly fitted by the sergeant-tailor, subject to the inspection and satisfaction of the company and battalion commanders, without expense to the man. It is unnecessary to comment on the great advantage of this toward reaching the neat and soldierly appearance that leads a man to take pride in and to live up to his uniform. The clothing is inspected monthly and its condition is checked. It is also inspected when the soldier is going to another country unsuitable for its use, or when he is discharged, and unreasonable damage is charged against him by his captain. From this charge he may

appeal to a Board. Damage to equipments is estimated by the captain or by a garrison mixed Board.

The theory underlying all this is that military clothing, like military arms, is public property put into the soldier's possession to increase his efficiency, and is not an allowance or a perquisite. He must use it for the public advantage, but may not abuse it, and he is not expected to make a pecuniary profit through it. The error, if there is any, seems to be that the allowance is inadequate for its purpose, involving a tax on the man to keep it up; and as the idea habitually associated with clothing is that it is personal property in the most intimate sense, there is probably some degree of dissatisfaction when the man realizes that it is not actually his own, but that he merely has the use of it under somewhat stringent conditions. There is the great advantage that the military clothing remains in the possession of the Government, that it is not degraded and made common by secular use, and that to find it in the hands of civilians is *prima facie* evidence of fraud.

Clothing that has been turned in partly worn may be re-issued, in which case its probable life is noted and the soldier receiving it is credited accordingly.

In barracks a man receives three blankets in summer and four in winter, and one pair of sheets. These are public property for which the company commander is responsible. The sheets are washed monthly at the public expense. A bolster is issued in lieu of pillows. On taking the field the soldier receives one blanket and one waterproof sheet, public property, for which the company officer is accountable, but which are charged against the soldier if lost or damaged.

The tunic is a scarlet dress coat, very similar in pattern to our own. The frock is a close counterpart of our blouse, but with a standing collar on which is the corps badge. It is dark blue in color, and is braided above the cuff. Good conduct badges are narrow chevrons or stripes worn across the lower part of the left sleeve. The great coat is very dark, nearly black, rather tightly fitting and long, with the cape detachable. The trousers are dark blue, with a narrow red welt or cord let into the seam. This was originally introduced into military trousers to identify them, should they be unlawfully

disposed of, as the welt is not easily removed. Dress trousers have a broad red stripe. In like manner the buttons on the outer side of the military cuff were placed there anciently with the utilitarian motive of making the substitution of the cuff for the handkerchief uncomfortable. The ankle boots are shoes coming well about the ankle, like our own issue shoe. A "shoe" always means a low shoe, which explains Parkes' assertion that "shoes cannot be worn without gaiters." The ankle boots are exceedingly and apparently unnecessarily heavy, the sole being excessively thick. A pair weigh nearly five pounds, or not far from twice as much as our own. The leggings are of light leather and come up well toward the knee. They seem to be well thought of for marching, although officers when mounted for the field, and I think sometimes when shooting, prefer the "putties," introduced from India. These are more of the nature of wrappings than of gaiters. The helmet is identical with the insufferable black German head-dress worn by our own forces, differing only in the substitution of the crown for the eagle. The forage cap is the Glengarry or Scotch cap, which is vizorless and of cloth, and thus easily folded and adaptable to the head in bad weather. This is worn by all the British foot.* The cross and crown in miniature are attached to it for the medical soldiers. Gloves are not worn on parade by enlisted men below the grade of sergeant. The uniform glove for officers is a tawny brown, except when a member of the royal family is present, when white must be worn. Chevrons are worn by the non-commissioned officers on the right arm only. The Guards wear one more stripe than the line, a sergeant's chevron consisting of four, and a corporal's of three sections. The distinctive mark of the Medical Staff Corps is worn on the right arm above the elbow. It is two inches in diameter, consisting of a white ground enclosed by a narrow yellow circle and bearing a red Greek cross. For privates the circle and the cross are worsted, for non-commissioned officers the circle is gold bullion and the cross is silk. This is ornamental as well as distinctive. A small and appropriate designation of similar size is earnestly advised for our Hospital Corps, in place of the exaggerated and unbecoming

*I believe that another pattern of fatigue cap has been adopted very recently (1894).

brassard with which our men are now enveloped. It is respectively suggested that if our Hospital Corps soldiers were allowed to wear a rectangle two inches square, enclosed in green, with the cross in white on a red ground, or in red on a white ground, they would be quite as distinctively and much less offensively marked than at present. The rectangle might be placed horizontally or obliquely.

Those articles not necessary for his daily use in the field, are known as the man's surplus kit, and are carried for him. The service kit is the clothes on his person and the necessary articles, the exact enumeration of which is difficult and not essential here.

For inspection in the ranks, the soldier is equipped with a waist-belt, sword, water-bottle, haversack, valise, and the necessary straps, and one ammunition pouch for bandages.

GENERAL DISCIPLINE.

The severity that formerly was supposed to characterize British military discipline, has been greatly meliorated in recent years, and although offences against order are promptly noticed, the penalties awarded are much reduced. Owing, it may be, to certain social traits, superficial obedience is prompt and praiseworthy. It is beside the purpose of this report to express any opinion upon the security of the deeper foundations of discipline under the present system.

Breaches of discipline are divided into offences and minor offences, and are noted on separate reports. Minor offences are disposed of by the company or the battalion commander or by court martial. A record of such action is entered on the defaulter sheets of the men concerned, and the men while undergoing punishment are known as defaulters. Soldiers are not confined for minor offences, such as absence from roll calls, overstaying a pass, or for slight irregularities in barracks. But while a man's case is pending he must not leave his barracks; he attends all parades, but is not for other duty. A drunken soldier is confined, but a soldier suspected of drunkenness may not be tested by drill or otherwise in order to ascertain his condition. Drunken soldiers are not to be examined until quite sober, generally twenty-four hours after confinement. All charges are investigated in the presence of the prisoner, usually at an

early hour of the morning, daily except Sundays. Medical officers commanding detachments may summarily reduce first and second class orderlies to lower grades, subject to the approval of the Principal Medical Officer. At Aldershot the medical officers commanding companies and the Depot exercise the same authority in this matter as officers holding similar commands in other branches of the service. A company commander may award minor punishment, not to exceed seven days' confinement in barracks. The commanding officer may award imprisonment not to exceed seven days, except for absence without leave, when it may extend to the length of the absence, not exceeding twenty-one days; deduction of ordinary pay, or in drunkenness a fine not to exceed ten shillings, and confinement to barracks, or extra guards and piquets. Drunkenness not on duty must be summarily treated, unless the man has been drunk on not less than four occasions within the preceding twelve months, and under certain other conditions.

The prisoner is brought before the commanding officer in the orderly room [commanding officer's office] and the witness makes a brief statement not under oath. Other witnesses are called if necessary, the man's record is examined, and the commanding officer at once announces his decision. A prisoner may be remanded for further inquiry, but his case must be continued daily. The prisoner may demand that the witnesses be sworn, or may demand trial by court, when the punishment exceeds certain specified limits. A commanding officer may summarily inflict punishment with hard labor for seven days, a fine not to exceed ten shillings for drunkenness, loss of pay for five days for absence without leave, or confinement to barracks for twenty-eight days. Extra guards or piquets may be ordered for minor offences connected with those duties. Confinement to barracks requires the defaulter to answer to his name at irregular hours, and to be employed at fatigue to the fullest possible extent, to relieve good soldiers. Punishment drill consists in marching in quick time, and is not instruction drill. It is not to exceed one hour on any one occasion. This summary dealing, as it is called, by the commanding officer is not to be confused with a summary court martial, which is a tribunal of the field.

In a large camp, like Aldershot, each corps, including the depot under discussion, has its own guard-house, which consists of a guard-room, a prison-room for the detention of men not disorderly, and cells for the seclusion of those requiring isolation and restraint. Ordinarily the guard-house cells are not used for sentenced soldiers. A provost prison is devoted to men sentenced, summarily or by court martial, to imprisonment not exceeding forty-two days. A military prison receives men convicted of grave offences involving disgrace, or those undergoing long sentences. A military convict is a man sentenced by a court martial to penal servitude, and is confined in a civil prison. The garrison and regimental provost prisons are inspected, and each prisoner visited daily by the orderly officer and by a medical officer, and reports are made to the commanding officer.

A defaulter book is kept for each company and one for each regiment, in which are entered all offences and the penalties inflicted, certain very minor conditions excepted. These entries are made and signed by the officers themselves. Every case of drunkenness must be entered. A uniform and convenient system of registration is prescribed. Deserters are not carried as such until after twenty-one days have passed. The punishments for military offences are graded and carefully prescribed in the regulations.

The Medical Staff Corps has its own guard-house and furnishes its own guard, although in common with that of all troops at Aldershot its guard duty is very light. The individual corps take care of their own sections of the large camp, and occasionally furnish the nightly patrols that enter the town. But the general order, outside of and when necessary within the regimental lines, is maintained by a special corps of military police, some of whom are mounted and some are on foot. As a consequence, the ordinary tour of guard comes about once in three weeks, and I have seen regimental returns that showed the men to have more than forty nights in bed. The guard maintained by the Medical Staff Corps serves the additional purpose of a school for recruits.

COMPANY DUTY.

The distribution of duties among the non-commissioned officers differs from our own. There is no First Sergeant, in our sense. There is a Color Sergeant for each company of infantry, who more nearly than any other corresponds to our First Sergeant. But he is charged less with the direct administration of discipline than with the care of the pay and the messing accounts. He is invariably the Pay Sergeant, and on that account is never detached from the company. His connection with the colors is merely nominal and the title seems to be one of tradition. The regulations say "they have the honorable distinction of attending the colors in the field;" but they are not color bearers. In the Infantry the Queen's color and the Regimental color are ordinarily borne by the two senior second-lieutenants, although standards and guidons of Cavalry are borne by the troop sergeant majors. The drill regulations prescribe that the colors, each carried by an officer, are placed between the two centre companies with a sergeant between them and that two non-commissioned officers or steady men with a sergeant between them in the centre are in the rear rank. This constitutes the color party. Apparently the color sergeant is so denominated at this time because he may have been one of those sergeants; but it is manifest that all the companies cannot supply a sergeant with the color party at once. It is probable that at some time this association with the colors was more intimate, and that the name has been retained after the function has lapsed. The troop sergeant major has similar duties in the cavalry to the color sergeant in the infantry, although as just pointed out he actually carries the colors. Their principal duties are clerical, as aids to the company commander with the official papers. The duty sergeants go on for a week at a time, according to roster, as Orderly Sergeants. In like manner subordinate duties are discharged by Orderly Corporals, that is by corporals who are designated to oversee certain conditions of discipline for a specified period, usually a week. The Orderly Sergeants during their tour are charged with and are responsible for many of the duties that be-

long to our First Sergeants. In this way familiarity with forms, with papers and with the character and needs of the whole company is attained by all. While "orderly" is used in the same sense as with us, to indicate a private soldier doing some special duty, commonly in the nature of attendance, out of ranks, it also designates an officer or non-commissioned officer engaged in a stated duty in the nature of superintendence or control. Thus the Orderly Officer is the Officer of the Day, and the Orderly Room is the Adjutant's or the commanding officer's office.

PAYMENT OF TROOPS.

Notwithstanding the complicated system of accounts and the curious variety of minor stoppages enforced against the men, the companies are usually paid weekly by their respective captains. Payment has no relation to muster. In fact muster occurs only twice a year and at irregular intervals. That is to say the day for muster parade is fixed a short time previously by the commanding general, and is arranged so that it occurs once in each half year, always on the first day of the month unless that day should fall on Sunday, when it is on the second.

It is not necessary to explain the particulars of the payment. The captain keeps on hand sufficient cash, drawn from the paymaster, to whom he makes a monthly account of his disbursements, embracing a balance for each man and his own balance sheet, accompanied by the necessary vouchers. Notwithstanding nearly forty headings, the most of which are subdivided into columns for £, s, d, and the minute amounts involved, the general method seems to work satisfactorily. The paymaster does not ordinarily, if at all, make direct payments. The payments are weekly and the settlement is monthly between the captain and the paymaster, who allows or disallows the account. When a man is transferred to another company or regiment a State of Accounts, a separate document from his Military History Sheet, is made out.

The system of paying enlisted men without direct reference to muster, and at irregular and, if desired, frequent intervals, obtains in the United States Navy. The practice of both services illus-

trates the feasibility of small and repeated payments for our soldiers without necessary confusion of the accounts.

The rates of pay have already been noted. The Regimental Savings Bank will receive deposits for soldiers, on which interest is paid at 3.75 per cent per annum (9d to £1). These deposits may be drawn in whole or in part at any time. Interest is not paid on more than £30 deposited in one year, nor on more than £200 in all, but bona fide deposits will be received to any amount. I found however that men inclined to save were more disposed to use the Postal Savings Bank than this, partly from its greater convenience, but chiefly because of a natural reluctance to have their small money matters kept in a way involving official scrutiny and a certain degree of publicity.

British officers do not draw their pay directly from the Pay Department, but each regiment or corps has as agents a firm in London whose relation seems to be that of private bankers, at least for this purpose, to all the officers of that corps. The officers draw upon these agents, and the Pay Department pays the agents and not the officers.

The pay of medical officers gradually increases from £200 a year when first commissioned, to £2 15s a day for the highest grade. Gratuities on downright severance from the service, ranging between £1250 and £2500, and on retiring "half-pay" from £1 to £2 a day, according to length of service, rank and other conditions, are a part of the compensation.

RATIONS AND MESSING.

The ration supplied by the government is: bread 1 lb, meat (beef or mutton) 12 oz., including bone, uncooked. All other food is supplied by the soldier himself. This is not a voluntary and irregular contribution, but it is derived from a formal daily stoppage on the pay-roll, the money never having reached the soldier's hands. This stoppage ranges from 3d to 4d, according to corps. In the Medical Staff Corps it is 3 1-2d a day, which is nominally equivalent to 7 cts. although its purchasing power is greater. Ordinarily this is devoted to groceries, which are purchased from the grocery shop of the Regimental Institute, a modification of the Canteen.

The Daily Messing Account is an official book used by each company, in which are entered the quantities and cost of all articles purchased. The delivery is made at an hour fixed by the commanding officer, when the sergeant cook, orderly corporal, and company cooks are present to examine and receive the supplies. The orderly officer also attends, to see that they are of proper weight and quality and are correctly entered. This issue and receipt is signed by the canteen steward, the non-commissioned officer in charge of rations, the color sergeant, and the company commander. (The commanding officer's signature verifies the cost and distribution.) A scale for messing, and a specimen mess account, printed on the first pages of the book for the guidance of the men, and therefore presumably a fair representation of the daily food, are reproduced for convenient comparison with our own allowance. This is in addition to the free bread and meat.

Scale of Messing for the Guidance of Color Sergeants.

Coffee.....	2½ oz. to 10 men (one meal).	
Tea.....	1 oz. to 7 “ “	
Sugar for tea.....	7½ oz. to 10 “ “	
“ “ coffee.....	1 oz. per man.	
Cheese.....	1 oz. “	
Butter.....	1 oz. “	
Jam.....	2 oz. “	
Golden syrup.....	2½ oz. “	
Brawn.....	2 oz. “ (breakfast and supper).	
Corned beef.....	2 oz. “ “	
Potatoes.....	14 lbs. for every 12 men (dinner).	
“ “	28 lbs. for supper per company.	
Vegetables for soup.....	4 lbs. “ “	} Of 60 men.
“ “ for supper.....	3 lbs. “ “	
Onions for soup.....	3 lbs. “ “	
“ “ for supper.....	3 lbs. “ “	
Salt.....	2 lbs. “ “	
Pepper.....	3 oz. per diem “ “	
Mustard.....	3 oz. “ “	
Currie Powder.....	5 oz. for soup, etc. “	
Split Peas for soup.....	6 lbs. “ “	
Lentils, “ “	6 lbs. “ “	
Barley, “ “	6 lbs. “ “	
Herrings.....	1 per man	
Flour for soup for thickening....	1 lb. per diem per company.	
Celery seed, for soup.....	1 packet.	
Milk.....	1¼ pints for every ten men per meal.	
“ for tripe stew.....	2 quarts per company.	
“ for porridge.....	1 “ for 15 men.	
Oatmeal.....	1 lb. for 10 men.	
Golden syrup for porridge.....	6 lbs. per company.	
Bacon.....	2 oz. per man.	
Eggs.....	1 per man.	
M'tt'n or P'rk ch'ps, or fri'd liver.	¼ lb. per man (breakfast and supper).	

Specimen Daily Messing Account.

Company Mess...	60			
Sergeants	3	Meals.	Description.	
Band	6	Breakfast, ...	Coffee, Fried Liver and Bacon.	
Drummers	3	Dinner, ...	Lentil soup, Turkish pillau, Potatoes.	
Married	4	Tea or Supper	 Tea and Pie.	
Total on ration...	76			

Balance.	Cr.	Brought forward	£0 0 0
60 men in mess at 3d.....			0 15 0
Money from Refuse fund.....			0 5 3
Total.....			£1 0 3
Deduct debt.....			£0 0 0
To be expended.....			1 0 3
Expended.....			13 8 ¼
Balance..			6 6 ¾

	Quantity.	Rate.	Breakfast.	Dinner.	Tea.	Total.
	lb. oz.	s. d.	s. d.	s. d.	s. d.	£ s. d.
Bacon.....	3 12	0 4½	1 4¾	0 0	0 0	0 1 4¾
B'k'g p'wd'r, pkt.						
Barley.....						
Brawn.....						
Bread, loaves....						
Butter.....						
Cabbage heads...						
Cheese.....						
Cocoa.....						
Coffee.....	0 15	0 10	0 9½			0 0 9½
Currants.....						
Curry.....						
Fish (Dried Ling)	6 0	0 3			1 6	0 1 6
Flour.....	1 0	1½		0 1½		0 0 1½
Jam.....						
Lard.....						
Lemon peel.....						
Milk, 7½ qts.....		0 2½	0 9½		0 9½	0 1 6
Mustard, per lb...	3	0 11		2		0 0 2
Oatmeal.....						
Onions.....	6 0	0 1		0 3	0 3	0 0 6¾
Pepper, per lb....	0 3	1 2		2		2
" cayenne..	0 ½	2 8		1		0 0 1
Pickles.....						
Potatoes, 7 stone.		4½		1 10½	0 9	0 2 7½
Raisins.....						
Rice.....	6 0	0 1½		0 9		0 0 9
Salt.....	2 0	0 ½		0 1		0 0 1
Spice.....						
Split peas, lentils.	6 0	0 1¼		0 7½		0 0 7½
Suet, Dripping ...	2 0	Free.	Saved in cook-house.			
Sugar.....	6 9	0 2½	0 9¼		0 7¼	0 1 4½
Tea.....	0 8¾	1 6			0 9¾	0 0 9¾
Vegetables, mixed	4 0	0 0¾		0 3		0 0 3
Herbs, 1 packet..		0 1		0 1		0 0 1
Total from Refreshment Department			3 9	4 6	4 8¼	0 12 11¼
Half a bullock's						
liver	7 0	1 6	0 9			0 0 9
Totals.....			4 6	4 6¼	4 8¼	0 13 8¼

Besides the free ration and the ration gained by the stoppage, it seems to be expected that the men will buy outright at least moderate amounts of other food, such as bread, cheese, and preserved meats. It is probable that more beer, under which term ale and porter are included, is drank than would be the case were the ration fuller.

The cooking for each battalion, is superintended by a sergeant cook who has passed through the instructional kitchen at Aldershot. When appointed he must be a non-commissioned officer of good character and intelligence, who has at least five years to serve. Under his orders is placed one cook for each company, a private who is changed only at long intervals or for misconduct. An assistant cook, to be changed weekly, may be detailed by the captain if necessary. A second cook, not lower than a corporal, may be instructed at Aldershot as an alternate to the Sergeant Cook. When the latter is on duty, the former serves in the ranks. There is a special class for cooks in the Medical Staff Corps at the Cambridge Hospital, Aldershot.

All the cooks are integral parts of the corps for whom they work. A monthly prize of 5s is given to the company cook who produces the best cooked and best served meals. This is awarded by the commanding officer on reports made during the month of the comparative excellence of meals prepared in the various companies, the notes being made at the time in a book kept for that purpose. The name of the prize winner is published in regimental orders. Special attention is now paid to the saving and the economical use of parts formerly thrown away; particular stress being laid on the saving of dripping, and its use in the cook-house. A fund is accumulated by the disposal of all the actual kitchen refuse and garbage, and this is divided between the companies in proportion to their strength, and it may be used for such purposes as the purchase of canvas fatigue suits for the cooks, for washing them, and so forth. There appears to be nothing corresponding to our Company Fund.

The kitchens are sometimes in and sometimes adjacent to the barracks. For the new barracks heretofore described, the kitchen

must be completely detached. In some of the cavalry barracks, the kitchen is on the same floor with, and in the next room to the troop stable. For the Medical Staff Corps they are in frame buildings similar to, and a few yards in rear of those occupied by the men.

Privates mess in the barrack rooms, on standing tables in the passage way between the rows of beds. The food is served in common and divided proportionately, except the bread. The bread allowance is an individual one made daily. Each man has the same quantity as his comrade, which results in waste in some instances and in insufficiency in others. I saw no example of garrison or regimental mess, in our sense. A regimental officer inspects the kitchens and appliances daily and the barrack rooms during breakfast, dinner, and evening meal hours.

Notwithstanding the privates and corporals mess in what must be regarded as an uncomfortable and unsatisfactory manner, and with a very moderate table, the sergeants live in comparative luxury. That "a sergeants' mess will invariably be formed if practicable" is a regulation, non-compliance with which requires special explanation. According to my observation, that mess was a comfortable club in a detached building, where the sergeants off duty find acceptable recreation rooms as well as a table distinct from their subordinates. The fundamental principle seems to be that of reserve as an element of discipline.

Officers' Classes of Instruction in judging the quality of provisions and forage are established at Aldershot. Four courses of a fortnight each are held in the year.

The instructional kitchen at Aldershot for cooks, contains, besides the ordinary garrison apparatus, working models of various forms of field kitchens in trenches and otherwise. For troops not in constant practice in the field, this is capital preparation.

FIELD RATION.

For convenience, the composition of the field ration is introduced here. In active field service the whole ration is supplied outright by the Government. It varies with the climate and the campaign,

but the standard schedule is as follows: Meat, fresh, salt, or preserved, 1 lb. Bread, 1 1-4 lb., or Biscuit [hard bread] 1 lb., or flour, 1 lb.; Tea, 1-6 oz.; Coffee, 1-3 oz.; Sugar, 2 oz.; Salt, 1-2 oz.; Pepper, 1-36 oz.; Fresh vegetables, when procurable, 1-2 lb., or Compressed vegetables, 1 oz. Also, when ordered by the Commanding General on the recommendation of the medical officer, Lime juice, 1-2 oz., Sugar, 1-4 oz., Rum, 2 1-2 oz.

REGIMENTAL INSTITUTE.

This is a recent extension of the older but comparatively modern Canteen system. It is for the exclusive benefit of the troops, and is divided into the Refreshment and the Recreation Departments. The former is subdivided into the Canteen, the Grocery Shop, and the Coffee Room. The theory of the Canteen is that it is a well-conducted tavern for the sale of wine, malt liquors, aerated waters, bread, biscuit, cheese, tobacco, &c. No spirituous liquor is allowed to be sold at Home stations. No liquor of any kind may be sold before 12 M. nor after tattoo, nor on Sunday during the hours of divine service. But excepting those hours, the bar is open on Sunday as usual. This is essentially a drinking-place, established in recognition of the national prejudice that stimulants are a quasi necessity, the drinking custom that finds its apotheosis in the elevation of successful brewers to the peerage.

The Grocery Shop has no connection except that of regimental management with the Canteen, and where practicable it is in a separate building. No liquor and no poisons may be sold there. Simple medicines, approved by the medical officer, may be sold, and any other article at the discretion of the commanding officer. This may be opened when the commanding officer directs, and it is closed half an hour after tattoo.

The Coffee-Room is associated with but is distinct from the grocery. It is to be divided from it by a partition, if a separate room cannot be had, and by preference it is an adjunct to the Recreation Room. Its purpose is to supply tea, coffee, cocoa and other non-alcoholic drinks, soup, fish, eggs, bacon, cooked and preserved meats,

&c. The regulations require it to be opened at an hour that will enable men to procure refreshments before the morning parade, which is a practical and significant commentary on the sufficiency of the ration. Men joining or leaving, who are not on rations, get a free meal from the Regimental Institute at its expense.

The Recreation Room is to have two apartments set aside for it when practicable, one as a reading room and one for games. A coffee room is to be maintained when possible, but no beer nor other alcoholic drink may be introduced under any pretence. Fuel and light are supplied by the Government, and the rooms are maintained partly by the Government and partly by very moderate subscriptions stopped against the pay of the men. These may not exceed 3d per month for privates and 6d for sergeants.

Besides these technical Recreation Rooms, an Amusement Hall, ranging from a narrow platform from which amateurs execute songs and dances to a well-appointed theatre where professionals are engaged to give formal plays, is generally attached to the Canteen, which pays the expense. The Canteen of the cavalry brigade in the South Camp at Aldershot secures elaborate performances of a congenial grade, free to all the cavalry soldiers and their families. In these rooms beer and tobacco may be used, as in the civil Concert Halls. The more thoughtful officers are divided in their opinion as to whether it is desirable to make the drinking places attractive by such adjuncts, or whether by banishing all beer from the latter those men who will drink would thus be indirectly excluded and driven to objectionable civil resorts.

The arrangement of the military day is such as to give both officers and men the greatest amount of leisure without interruption. Thus, at Aldershot the Medical Staff Corps recruits are given six hours' work a day, but ordinarily that ceases at 2 o'clock, and the last hour's drill is under a sergeant. Unless on some special duty, as Orderly Officer, Guard, or the like, the working day ceases for officers at 1 P. M. There are no afternoon parades, and the men's Tea is served at 3:30 P. M. As there is no general roll-call at Retreat, as the "last post" of Tattoo is at 10 P. M., and as many good conduct men and non-commissioned officers are allowed

to be absent until midnight, this arrangement gives very wide liberty of movement. But it also leaves a very long interval between what is necessarily a light meal and breakfast, and stimulates resort to some branch of the Regimental Institute. There is, however, the very excellent regulation that regimental arrangements are to be made for issue in the night to the guard of a cup of hot coffee from the Canteen or the Grocery Shop.

POCKET LEDGER.

On joining, every soldier is supplied with a Pocket Ledger resembling but much more elaborate than our Hand Book. It folds flat within a flexible waterproof cover, when it may be tied by an attached tape. This book contains a military description of the man, a record of his service abroad, his changes in rank, his good conduct pay, his campaigns, actions and medals, his classes of instruction, marriage, children, wounds, certificates of education, cause and date of discharge, all these entries being verified by an officer's signature and some of them made in the officer's own hand-writing. The alleged object for keeping these is that the soldier may secure a proper settlement of his accounts and may establish a claim to such benefits as may be awarded men when discharged. I do not understand that this may supersede the Military History Sheet, or that in case of discrepancy it would be preferred to it. It seems to entail a large amount of unnecessary writing, certainly viewed in relation to our own service, for whose application these observations are intended. It also contains a list of next kin for four removes and their residence. This is corrected annually about the first of January. There are also printed extracts from the regulations affecting discipline, and forms of wills suited to various contingencies. It further contains the man's clothing account by months and an itemized account of issues and withdrawals, and his measurement, all for ten years and every entry certified by an officer. The measures are taken annually. The object of this is not plain, except that it may afford an indirect guide for the issue of clothing. There is also a place for the monthly statement of his Savings Bank account for the same decennial

period. The statistical part of the book, that is the part relating to pay and clothing, may be withdrawn when filled and other pages introduced. The soldier's religion is entered in the Pocket Ledger, and he has a formal opportunity to change his religion and to make a new entry once a year.

What is ordinarily spoken of as the soldier's discharge is really, with men of less than twelve years with the colors, a transfer to the Reserve. It is from these men that England expects to fill her ranks in war. The men of the Medical Staff Corps go to its Reserve. How far this expectation will be realized can only be determined when the emergency arises.

Upon leaving the colors, the soldier is given two certificates: one of transfer (or of discharge) and one of character, unless discharged dishonorably. There are ten different expressions for character, from "Exemplary" to "Very bad," including such as "Formerly good," "Latterly bad," one of which must be used in the description. Any special qualification for civil employment is also entered immediately below the character, unless that is "Bad" or "Very bad." Men specially deserving of civil employment, whom commanding officers wish to bring to the notice of the National Society for the employment of such men, will be given an additional certificate to that effect; and commanding officers are responsible that only men who are in every respect trustworthy and deserving of employment receive it.

With the discharge (or transfer) is given a parchment envelope for its better preservation. The advantage of that for men who usually have no facilities for the care of documents is obvious, and its adoption is recommended.

OFFICERS COMMANDING DETACHMENTS MEDICAL STAFF CORPS.

In closing the subject of the Medical Staff Corps as an organization, I add these memoranda pertaining to the specified duties of the commanding officer of a detachment.

If, as would usually be the case, the medical officer is in charge of a hospital, he is responsible for the systematic training in hospital duties of the officers of the medical staff and of all the mem-

bers of the Medical Staff Corps detachment. Besides the practical training, he is required, either directly or by a representative, to hold classes of instruction in the duties they may be called upon to perform under any circumstances. He arranges for the daily inspection of the non-commissioned officers and privates at such a morning hour as may be convenient, at 8:30 A. M., at 2 P. M., and at tattoo, to ascertain that all are present, clean, sober, and properly dressed. Residence of the detachment within the hospital does not appear to be contemplated. No other parades or inspections will be held without his sanction. He holds such inspections, drills and parades as necessary. He frequently inspects those out of barracks. Monthly or more frequent inspections of equipments, clothing and necessities are made by the medical officer, who is responsible to the Principal Medical Officer that such are kept complete. He is required to give medical officers under him every opportunity of acquiring knowledge of hospital administration, and of the internal economy and discipline of the Medical Staff Corps. With this view the junior medical officers will, as a rule, invariably be present when prisoners are dealt with, and will be examined weekly by the medical officer in command, or by a deputed officer of rank, as to their knowledge of the various regulations affecting their duties. Very minute instructions are in force as to forwarding to the Principal Medical Officer and noting on the proper forms the action by summary award or by the various courts in the case of the men of the Medical Staff Corps. A British soldier may be tried by a General, District, Field, Regimental, or Summary Court Martial, or may be dealt with by summary award. The medical officer is responsible that the weekly estimate for funds is forwarded in time and that the detachment is paid in the presence of an officer. He appoints a qualified non-commissioned officer as Pay Sergeant. In general terms he is responsible that the whole system of accounts as applied to the individual is carefully carried out, and that all of the numerous papers, unnecessary to be rehearsed here, that mark and guide the soldier's life are properly filled in and filed. Fourteen kinds of books and forms are necessary for the administration of a de-

tachment. The medical officer in command forwards all recommendations for advancement of privates to 1st and 2d class orderlies to the Principal Medical Officer, by whom they are appointed. Only privates of good character showing exceptional aptitude as nurses or cooks may be recommended as 1st Class Orderlies, and 1st Class Orderlies are not to be employed in other capacities. A non-commissioned officer reduced becomes a 2d Class Orderly, and when reduced and imprisoned a 3d Class Orderly. Every facility is to be given non-commissioned officers and privates to become compounders. All recommendations for promotion in the Medical Staff Corps are to be made by the Medical Officer in his own handwriting, with a full statement of the reasons. Privates must have a second-class certificate of education and one year's service, including six months in the corps, before permission is given for examination. Only such men are to be recommended as are likely to become good non-commissioned officers. As elsewhere remarked, the doctrine of graded duty with consequent responsibility and reward runs through the whole scheme. It is encumbered by many formalities not necessary in our service, but the central principle is correct and should be accepted in our practice.

FIELD SERVICE.

Service in campaign is provided for by the mobilization of Bearer Companies of the Medical Staff Corps, by an Ambulance Train, by a succession of Hospitals from the base to the fighting line, and by medical officers attached to the military organizations.

MATERIAL AND EQUIPMENT.

The panniers and other cases employed in the British service, examples of which were introduced to our army by Col. Vollum, Medical Department, that with modifications have been adopted by us, do not require the minute description that formerly would have been necessary. The Medical Field Panniers are: No. 1 Medicine Pannier. It weighs about 90 lbs. and contains: (1) A variety of medicines in moderate amounts and in the older gross forms; (2) In two drawers, stationery and minor appliances,

as needles, camel-hair pencils, stethoscope, hypodermic syringe; (3) Medicated gelatine discs and lamels, the lamels being for internal use and the discs for hypodermic and ophthalmic use, and syringes and candles, a set of Duncan's splints (light reed extension), and a case of instruments. No. 2 Pannier. It weighs about 80 lbs. and consists of two baskets. One of these carries bandages, lint, tourniquets, needles, plasters, and sponges; the other, Esmarch triangles, extract of meat, an *Ætina* and spirit, dressing basins and urinal (rubber), gauze, and a lantern and candle. All the appliances are antiseptic. One tin holds catgut drainage tubes and plaster, another more bandages. There is a Reserve Medical Pannier weighing 84 lbs. That, as its name implies, contains supplies from which to replenish the Nos. 1 and 2. There are also two "special" Surgical Panniers, known as 1 and 2, each weighing 84 lbs. These contain anesthetics, dressings, other appliances and operating instruments. A Field Medical Companion contains a few of the simpler medicines and appliances for immediate use. This is a working assortment arranged for convenience of handling, and it weighs about 11 lbs. On the march it is carried with No. 2 Pannier. This Companion is also used under many other circumstances, as at the Inspection Room, on shipboard, and with detachments. The Surgical Havresack weighs about 5 lbs. and contains specification tallies, solution of morphia for injection, ammonia, antiseptic dressings, adhesive plaster, sponges, tourniquets, wax candle and matches, wire arm splints, and a dressing-case. The dressing-case holds a knife, scissors, forceps, pins, needles and thread, &c.

The Medicine Pannier carries 1-2 pt. of distilled water, and a graduated horn cup. Both may be serviceable in the field. The *Ætina* is a metal contrivance in the nature of a portable spirit furnace, that shuts up very compactly when not in use, and by which hot water and soup may be prepared with very little trouble or delay. It is worthy of adoption. In other respects I regard our new chests as better supplied, both as to the character and the form of the contained articles.

MEDICAL SERVICE.

For troops in active service a medical officer is attached for the campaign to each regiment, battalion, troop, or company of Royal Engineers. He renders such temporary professional assistance to the disabled as may be required in camp, on the march, or in action. He is a staff officer of the commander of the unit, is his adviser on sanitary matters, and is under his orders, but he receives instructions from and is at the disposal of the Principal Medical Officer of the division. For the larger commands he has a corporal, a private as an orderly, and a private as a personal servant, taken from the ranks of the command. When with a troop, battery, or company, no corporal is furnished. With regiments, &c., he has field medical and surgical panniers, a medical companion and water-bottle, a surgical havresack, and a circular tent; with smaller bodies, the companion, water-bottle, and havresack. His records are a diary entered in a blank book. He draws this property before taking the field and turns it over for transportation with the regimental baggage, but it remains in his charge and the commanding officer must see that it is always at his disposal. The regimental stretcher bearers, two to a company, are placed at his disposal when an action is anticipated. It will be observed that the regimental medical officer derives no aid from the Medical Staff Corps, but depends entirely upon the men of the active command. The sick are sent to him with the usual duplicate company sick reports. If a man is sent to hospital, one copy of the sick report is sent with him and the other is returned to the commanding officer, with the disease and the destination marked upon it. The medical officer enters in his diary the names, diseases, and disposition, but makes no other report unless required by the Principal Medical Officer of the division. That is simplicity itself.

The regulations prescribe that when an action is expected, the regimental bearers transfer their rifles and valises to the carts, take out the stretchers, and become at the medical officer's disposal for service with the wounded. I do not know that this has yet been tried in actual war. Two probable difficulties occur to me:

(1) With a large body of advancing troops the wheeled transportation would be out of reach in the rear; and (2) the great unwillingness of all commanding officers to spare effective men from the line of fire. This would increase in proportion to the apprehended severity of the engagement. These regimental bearers, who are not to be confused with the bearer companies, having reported to the medical officer, proceed under his direction to the scene. The orderly accompanies the medical officer, and the corporal remains with the panniers. This implies that the transport has been brought further to the front than is probable in life. Should the attempt be made in our service to keep the regimental medical supplies up to the line of actual contact with the enemy, or at all near it, I should advise the use of pack animals. Wheels would be efficient as long as daily camps are made; but in moving out to fight, the corporal and his panniers would be left behind. After the battalion medical officer has given first aid to such cases as are suitable, the wounded of the fighting line are conveyed to the collecting station by his regimental bearers alone, or as succoured by the bearer company. But the medical officer and the regimental bearers are not to lose touch with their own corps, to carry the wounded long distances, nor to attempt to pass to the rear of the collecting stations. From these they at once return to the fighting line. The knowledge that a medical officer is with them, increases the morale of the command. In practice, unless fighting under general cover, I doubt whether it will be physically possible for any medical officer to reach many of the wounded where they fall; and an advancing line will very rapidly leave the medical staff in the rear, unless that staff passes the disabled without assistance.

The theoretical composition of a British army in the field is a certain number of Army Corps, any one of which may be an independent army. An army corps consists of three divisions, and a reserve of artillery and engineers. The two latter are styled the corps troops. A division of infantry in the field consists of two brigades of infantry, one squadron of cavalry and three batteries of artillery. With these as "divisional details," are one divisional Reserve ammunition column, one Field company of engineers, one company Army

Service Corps, and one Field Hospital in reserve. A brigade of infantry consists of four battalions of infantry, two machine guns, one company Army Service Corps, one Bearer Company, and one Field Hospital.

An army corps thus constituted has a strength of 35,110, and has 10 field hospitals: that is, one hospital for each of the six brigades, one in reserve for each of the divisions, and one in reserve for the corps. There are six bearer companies to the corps, besides the regimental bearers. A cavalry division, which may or may not be attached to any corps, consists of two brigades. Its strength is 6,705, with three field hospitals, one for each brigade, and one in reserve for the division. The hospitals are designed for one hundred men each, and temporary provision is thus made for 1,000 infantry, or rather less than 3 per cent., and for 300 cavalry, or about 4.5 per cent. Were the whole force simultaneously engaged, this would probably be insufficient unless only severely wounded men were admitted. Each army corps, on taking the field, would have with it ordinarily, 40 medical officers, exclusive of the administrative officers and of those attached to the bearer companies and to the field hospitals.

The division is the field military unit, and is the one to and from which the formal medical reports are made. But the brigade is the subsidiary unit, with which bearer companies and field hospitals are allied. If possible, the bearer company and the field hospital and their transport sail in the same vessel and with the brigade to which they are attached.

Every soldier, before taking the field, has a descriptive card sewn into his clothing.

BEARER COMPANY.

A bearer company for war is organized from the Medical Staff Corps and its Reserves, and consists of 3 medical officers, 1 warrant [non-commissioned staff] officer, 6 staff sergeants and sergeants, 1 bugler, and 53 rank and file. The latter comprise 6 corporals, 8 privates, 3 privates as cooks, 32 as bearers, 3 as servants, and 1 supernumerary, total 64. One public and three private riding horses accompany the company. Attached to the bearer company are the

following transport troops, taken from the Army Service Corps: 1 officer, 1 sergeant, 2 artificers, 1 bugler, 38 rank and file. The latter are 1 corporal, 1 second corporal, 29 privates as drivers, 1 bat-man, 1 cook, and 3 supernumeraries. There are 5 public riding and 58 draught horses with the company. It is important to observe that all the drivers and all the men associated with the transportation come from the Army Service Corps, and not from the Medical Staff Corps, although they are controlled by the latter when attached to it. In effect, therefore, a Bearer Company has the value of 4 officers, 101 men, 9 riding and 58 draught animals.

The attached transport is divided into 1 2-horse cart for supplies, 1 for tents and 1 for water, 10 ambulance wagons, 1 general service [army] wagon for equipment, 1 for medical stores, in all fifteen (15), supplied by the Medical Department, and one wagon for the use of the Army Service Corps. The last wagon and all the drivers and horses come from that corps.

The bearers of the Medical Staff Corps company are taken from its reserves. In action this company is divided into two stretcher sections, each of 1 sergeant and 16 privates, both under one medical officer, 1 sergeant to remain at the collecting station, and 5 corporals and 5 privates for the ambulances, and 2 medical officers, 4 non-commissioned officers, 1 bugler, and 4 privates, including a cook, for the dressing station. The quartermaster-sergeant in charge of the property, 2 privates, cooks for the company, the officers' servants, and 1 supernumerary, are in rear of the dressing station; total, 61 enlisted men.

The bearer companies are charged with the succor and collection of the wounded on the field, and they carry them to the dressing stations and field hospitals. They also pick up and carry to the field hospitals with the wounded their kits, arms, accoutrements and ammunition. The companies are associated with and encamped close to the field hospitals, in order to assist in pitching the field hospital tents, in dealing with the disabled, and in providing hospital guards. But throughout the campaign "the bearer company organization will be maintained separate and distinct from the field hospitals." The common superior appears to be the Principal Medical

Officer of the division. Although attached to each brigade, they are not a part of it, but are entirely at the disposal of the division authorities, who will detach or mass them as required.

The field hospitals have a light equipment, to enable them to move with the troops, and all the sick and wounded from the front pass through them. Each is arranged for 100 beds and has belonging to it 4 medical officers and 1 quartermaster, 1 warrant [n-c-s] officer, 7 sergeants and 32 rank and file. The sergeants are 1 ward-master, 1 steward, 2 compounders [dispensing stewards], 1 pack-store keeper, 1 cook, and 1 supernumerary. The rank and file are 4 corporals, 1 each as steward, clerk, cook and supernumerary, 14 privates as ward orderlies, 1 each as cook, pack-store keeper and messenger, 2 as washermen, 5 as servants, and 4 supernumeraries; total enlisted, 40. One public and 5 private riding horses accompany the hospital. Attached to it from the Army Service Corps are 1 warrant and 3 non-commissioned officers, 1 farrier, 18 privates as drivers, 1 as cook; total enlisted, 36, with 3 riding and 36 draught horses. The field hospital is susceptible of division into halves, the detached half taking with it the sergeant major as an acting quartermaster, and 19 other enlisted men.

The transport attached to a field hospital consists of 4 2-horse carts, one each for supplies and tents and two for water; 4 4-horse wagons for medical and surgical equipment; and 2 4-horse wagons for baggage and reserve rations, all supplied by the Medical Department, and one 4-horse wagon from the Service Corps for its own use.

It will be observed that for both the company and the hospital transport, 4-horse teams are provided with two drivers each. Apparently the wheel driver sits on the box seat, the lead driver rides the near leader, and "the wagonman marches with the wagon and puts on the drag when required." We should hardly require three men to a wagon. The wagon with its own equipment, but unloaded, weighs 2,454 lbs. A bearer company wagon for stores carries 1,577 lbs. contents, total draught 4,031 lbs. The weight of the other loaded wagons ranges from 3,713 to 4,102 pounds. Our own 6-mule army wagon weighs about 2,100 lbs., and may carry when loaded, 4,000 lbs. It is driven from the near wheeler. The

4-mule escort wagon weighs 1,600 lbs., and may carry nearly 3,000 lbs. It is driven from the box. There is no specified lading for either, which must depend on the country in which operating.)

These wagons are so packed as to be capable, without re-arranging their contents, of establishing two independent hospitals of fifty beds each. The wagons for field hospital stores are divided into three compartments, with one fixed underneath, which are fitted with certain boxes, some of which are again subdivided. The regulations give plans of these and minute directions for packing the contents. Great ingenuity and care have been displayed in utilizing the whole space. The objections to such detail, which I fear would be fatal in the field, are that an unfitted wagon cannot replace this in emergency without loss or damage of material, and that with a fitted wagon it requires a packer skilled in the work to understand where to find, and especially where to stow, the various items. Untrained men, even with the regulations before them, certainly cannot pack this wagon under the working conditions of the field.

No part of the transport, whether wheeled or pack, furnished bearer companies or field hospitals, may be used for any other purpose or be taken from them, except by authority of the commanding general. On the march the field hospitals follow the bearer companies.

The companies and the hospitals are arranged on a basis of

* Our own army wagon, although excellent and an evolution from extensive experience in the civil war and on the plains, is susceptible of improvement. As very well observed by 1st Lt. L. D. Greene, R. Q. M., 7th Infantry, in his report on the Sioux campaign of 1890-'91, this wagon body has its centre of gravity too high, a special fault when loaded with bulky baggage for side-lining roads; it does not track on country roads; it is coupled unnecessarily short for our ordinary service; and the body might well be eighteen inches longer, thus making the load less top-heavy. As shown by experience with native Indian freighters, three light two-horse wagons are more adaptable to the requirements of the frontier, at least when the trails are rough or the rivers are covered with weak ice, and the loss of one of these is by no means as inconvenient as the destruction or breakage of a large wagon. The only additional expense in their operation would be in the hire of drivers, where civilians are employed.

The comparative ease of movement of such lighter transportation makes it well adapted for hospital trains that should keep up with the troops.

brigades, but they are under the control of the Principal Medical Officer of the Division, and are generally referred to as the Division Hospital. In practice, each brigade hospital would probably be regarded as a section of the division hospital, but would make its own reports.

In establishing a field hospital, advantage is to be taken of suitable buildings, tents being pitched when such are not available. The tents for field hospitals are circular with low upright walls, the roof converging to a central pole. They remind one of a magnified "modified Sibley." The weight of each, dry, is, old pattern, about 75 lbs.; new pattern, 100 lbs. Each tent will hold four patients. Thirty tents in all are carried for the hospital. Two or three times as many well men are put in such tents, of which eight are carried for the officers and men attached to the hospital, and as many for the bearer company.

On lines of communication, when buildings and circular tents are not available, the hospital marquee is used. This is a heavy rectangular wall tent with a sloping roof, 30x15 ft. at base, wall 5 ft., height to ridge 15 ft. A waterproof floor is issued with it. It accommodates ten patients, but it weighs 600 lbs. when dry, and is cumbrous and difficult to pitch. The *tente d'abri* is not used at all.

In my judgment our system of tenting in all its particulars, whether considered for shelter, artificial warmth, convenience of transportation, or general adaptability to the requirements of campaign, has nothing to acquire from that of Great Britain.

The field hospital is the first place to which the daily sick are sent, only the most trivial cases being left with the regiment. All the cases not likely to be fit for duty soon, if they would not suffer by removal, are transferred as soon as possible to hospitals on the line of communication. The regimental medical officers are cautioned against passing to the field hospitals men not requiring hospital treatment, and at the same time against detaining at the front men who are really sick. The policy of detaching the sick as completely as possible is steadily pursued. Before an action all patients that can be moved are sent to the rear, but when the number of sick

and wounded, the want of transport, or any other circumstance prevents the removal of a field hospital, it ceases to be such, and becomes one of those on the line of communication, its place being supplied by a field hospital in reserve.

IN ACTION.

The battalion (regimental) medical officers and their two bearers per company are already on the field and are presumed to have secured their own stretchers from the transport. A medical officer and two stretcher sections (eight stretchers) from the brigade bearer company also go out to collect the wounded. Two of the four bearers carry the stretchers; the other two are supplied with the surgical havresack and a water-bottle, and are charged with carrying the arms, accoutrements and ammunition of the wounded to the collecting station. The four medical officers of the battalions (regimental) are supposed to have already applied such first aid as is possible. The collecting station is in charge of a sergeant who has a few first dressings, and is as near the line of battle as is consistent with safety. It is under shelter if possible. The ambulances are divided into a first and a second line, and those from the first line run between the collecting and the dressing sections, and on no account are to pass beyond the latter during an action. Each ambulance is accompanied by a corporal or a private of the bearer company. The dressing station, if possible, is out of fire and is to take advantage of water-supply and of buildings; but the collecting and dressing stations are never to be far apart, and under some conditions they may be combined. Before the search for wounded is abandoned, all woods and ditches are systematically examined, and lanterns form part of the equipment of a bearer company for such work in the dark.

This schedule contemplates but a single collecting station for a brigade of four battalions, which with the modern formation will occupy a wide front. In practice however it will probably be found that each battalion medical officer will have established a collecting station of his own, before the bearer company can have reached the field. Almost certainly these depots of severely wounded

will be a series of temporary refuges behind natural obstacles, from which the lines of transfer will converge to a dressing station, not necessarily equi-distant, but established with primary reference to a road to the rear, and these temporary refuges will change with the progress of the engagement. It will also be found that many of those wounded in the upper extremities, or with flesh wounds, will not only avoid these rendezvous, but will drift past the dressing station itself in search of the more permanent repose and greater safety of the field hospital.

The theoretical constitution of a dressing station, which involves the use of an operating tent (circular) if no suitable building is found, has already been explained. Two medical officers and a few men, including a cook, constitute the force here. Beef tea and similar stimulants are prepared, and more officers and more men may be drawn from the field hospital should the pressure of work be great or the distance considerable. When dressed, the wounded are placed in the ambulances of the second line and sent to the field hospital. The character of the operations at the dressing station depends upon circumstances, but it is understood that the place is as the name indicates, one where wounds are to be dressed only, and everything that can be deferred without harm to the patient is left to be done at the hospital. It may happen, however, that the dressing station shall ultimately become a section of the field hospital itself. The route to the dressing station and to the hospital is indicated by directing flags. At night the establishments are shown by a red lamp between two white ones.

When the necessary treatment has been given at the dressing station a diagnosis ticket is attached to the man's clothing. This may have already been done on the field, when it will be modified if required. The diagnosis ticket, or specification tally, is identical with and is the original of the one recently introduced in our army. It is of white linen or heavy paper marked in five lines for "No. or name," "Rank or Reg't," "Wound," "Treatment," "Signature of Surgeon," with a counterfoil of half its length from which it may be torn through perforated lines. Although much better than nothing, this is a rather bald and insufficient method. Some

of the continental armies employ white tags to indicate that a man may be moved, and red ones that he may not. This is objectionable in so far as it requires a double supply to be in readiness. Surgeon W. G. Macpherson, of the British army, in a paper read at the 10th International Congress (Berlin, 1890,) proposed to continue the white and red tags with these additions: I, case to be dressed; II, to be operated on; III, already dressed, i. e. not to be interfered with until other indications; *a*, foreign body removed; *b*, foreign body not yet removed; *c*, presence of foreign body undetermined. Thus, one of the enemy falls into our hands with a red tag II *b*. It means that the body is insusceptible of transportation and has a foreign body in the wound. The Austrians use a system similar to this. Major V. Havard, of our own Medical Department, has very recently suggested that the diagnosis tag be white with a red and a blue border. On the red "To be transported," on the blue "To remain." On the body of the slip are to be entered the date, name, rank, regiment, injury and treatment. If a flesh wound, whether the man may walk or not, both borders are to be torn off. If severely wounded, unable to walk but capable of transportation, the blue border is torn off, leaving the red. If he is capable of being moved without danger to life, the red is to be torn off, leaving the blue. A combination of those systems, with a slight modification of each, might be arranged to afford an international code and enable the successive medical officers into whose hands a case might fall, although ignorant of the language of the inscription, to understand its history without repeated examination of the patient.

A field hospital is non-dieted. That is, the men are supposed to bring with them their rations for the day, and instead of the regular hospital diet the field ration will be cooked, supplemented by such extras as the medical officers may advise and the officer in charge of supplies can procure. The latter are issued on diet sheets. No hospital clothing is issued field hospitals, and clothing absolutely necessary for patients is drawn from the clothing depots. Washing is done by the washermen attached as such, the materials being obtained from the Supply officer. Kits, arms and

accoutrements are entered in detail in the pack-store book, and are transferred with the men from place to place. The management of the hospital is as far as possible according to the rules of a station hospital, and especially no man is allowed to pass toward the rear whose name has not been entered in the Admission and Discharge Book [Register], and every particular concerning him has not been recorded. When men are to be transferred to the rear, individual medical certificates, according to a form, are prepared from the Admission and Discharge Book and a nominal roll in duplicate, showing numbers, names, corps, diseases or wounds, and dates of admission and transfer. The certificates and one roll are sent with the party, and the duplicate roll is sent to the Principal Medical Officer. The Certificate and our Transfer Slip correspond in function. The medical officer in charge of the field hospital replenishes from his reserve panniers the supplies of the medical officers with the battalion and the bearer companies, on their requisition. He renews his own stores by requisition on the medical officer in charge of the advanced depot.

He sends a daily State [Report] of Sick and Wounded to the Principal Medical Officer of the division, and a weekly Return of the Sick alone (less elaborate than the Return from Station Hospitals), to the Principal Medical Officer of the army. As soon as possible after an action he prepares duplicate nominal rolls of all officers and enlisted men wounded therein, specifying briefly and accurately the kind of injury and its severity. One copy is for the Commanding General through the Principal Medical Officer of the army, and the other goes through the Principal Medical Officer of the division for the Director General.

OTHER HOSPITALS IN CAMPAIGN.

A General Hospital, organized and administered as already described for other General Hospitals, except that its equipment is held from the Ordnance Store Department, is to be opened at or near the base of operations. The scale for such a hospital is that for 500 beds. Attached to this and to other General Hospitals is a military depot for the men discharged from the hospital.

This Depot is a part of the organization of the hospital, and accompanies it on active service wherever it may be moved. The commanding officer of the depot has no authority over the hospital itself nor over any one connected with it, nor may he interfere with its discipline, order, or arrangement, which are entirely under the control and orders of the Principal Medical Officer. But besides being in command of the convalescents discharged from the hospital, he takes charge of the arms, ammunition, &c. of the patients sent from the front, he supplies them with the necessary clothing, disposes of questions of pay and allowances, issues transportation, conducts all correspondence not medical, interments the dead and disposes of the effects of the deceased, and reports the arrival and departure of patients and the deaths in hospital to their corps as well as to the military authorities. He supplies hospital guards and fatigue parties from the strength of the depot. This is in effect a Convalescent Camp, whose commanding officer is the adjutant and quarter-master of the hospital, but over whom the medical officer has no control, and who, in turn, cannot control him. It makes the administration of the hospital double-headed, with a necessary division of authority, and, it would appear, a risk of confusion and a certainty of delay. The depot commander must depend upon the medical officer for his information; the medical officer must depend upon the depot officer for the accomplishment of much work. This arrangement appears antiquated and undesirable of imitation.

The medical officer in charge makes weekly returns in duplicate, by regiment or corps, of all men present. The system actually in vogue is somewhat complicated, but a weekly report to company commanders, of admissions as well as of death and discharges, might be useful in our own service, in permitting those officers to trace their men through the somewhat prolonged chain of hospitals that are part of an army in a great campaign.

All general hospitals have special accommodations for officers, and when an officers' hospital is opened on active service special scales of diet may be issued.

HOSPITAL SHIPS.

Should it be inexpedient to form a general hospital on the sea-board, one may be established on a hospital ship; or these may be used to supplement the former. The responsibility for the hospital ships of an army is divided between the Admiralty and the War Office; and this curious dual relation is reported, not for emulation, but as history. The Admiralty provides lodging, victualling, and conveyance of the sick, and supplies cooks, shipping, fittings, bedding, food, medical comforts, disinfectants, washing, and mess utensils of every kind. The War Office supplies medical and other attendance for treatment and nursing, furnishes all personal and hospital clothing, medical and surgical appliances, and hospital utensils. The ship is fitted out under the superintendence of representatives from both services. When necessary, each division of an army corps may have a steam hospital ship with a capacity of 200 to 250 beds. One or more fast steam vessels having a capacity for 60 beds may be used as Relieving Ships, to carry the worst cases to England or elsewhere; and steam dispatch vessels with canvas cots may be used to take less grave cases to intercept packets. Every hospital ship has a small steam transport as store-ship, with 400 cots more than those in use on board. These may be fitted into transports to remain at the base when more hospital accommodation may be needed. Every transport is required to have accommodation in its sick bay for 3 per cent of the force it carries, and hospital transports remaining at the base may be transformed into emergency hospitals when required. The medical officers in charge of hospital ships shall conduct them as far as possible as station hospitals, and on arrival at home for discharge the senior officer in charge of ordnance stores takes charge of the War Department property.

The hospitals between the field and the general hospitals are known as "Hospitals on the line of communication," and they are a medium between the others in size and permanence. The scale of supplies for them is that for 200 beds, and is arranged with the view of this being readily moved. But these hospitals are not supplied with transportation of their own. They are to be established

in such suitable buildings as may be found, and if such are not available, then in hospital marquees. Directions are given for the selection of sites for sanitary considerations and ease of communication. It is prescribed that these and provision stations are to be placed at regular and convenient intervals. Each hospital has separate accommodations for officers. Washing is done by attached washermen. A pharmacy wagon and a surgery wagon are a part of the equipment of these hospitals; the former closely resembles the Autenrieth wagon, supplied our army in the field the latter part of the civil war, and the latter is an army wagon devoted to medical and surgical supplies conveniently packed in baskets. For hospitals of this character these wagons are very suitable.

When patients are to be transported toward the base, the same rolls are prepared as at field hospitals. A medical officer proceeds in charge of each party, with a non-commissioned officer of the Medical Staff Corps who has charge of the kits, arms, &c., and signs for them. If a man and his effects are left at an intermediate hospital, the disposition is noted on the nominal roll. If a man dies en route, his effects are taken on to the base.

No Daily State is required from these hospitals, but a Weekly Return, similar to that from the field hospitals, is made. Medical officers in charge of all hospitals furnish the Principal Medical Officer of the army, when called on, with a descriptive numerical classified return of wounds, injuries, and the result of operations.

The whole scheme of the hospital service in the field is based on the theory of invasion and of active columns proceeding from a marine base, where the general hospital is established and whence the process of transfer to England of the seriously disabled is carried out.

QUARTERMASTERS.

The Quartermasters of the Medical Staff are officers with honorary rank, invariably appointed by selection from the staff sergeants of the Medical Staff Corps. They serve under Principal Medical Officers and the commanding officer of the Depot, and are attached to hospitals and to other medical commands, reporting to

these officers and relieving them from the immediate performance of much official drudgery that would fall upon our officers in like places, as well as discharging duties created by and peculiar to the British system. Omitted in its natural order in the earlier part of this report, this *resume* of their duties in garrison as well as in the field is introduced here.

In general terms the quartermaster attends to, and is responsible to the medical officer for, all matters connected with stores, equipment, and accounts. Under the Principal Medical Officer he is responsible for all duties connected with the clothing and equipment of the Medical Staff Corps of the district or command; he may act as sub-accountant for the payment of the corps; and he has the custody of the instruments and supplies in charge of the Principal Medical Officer. When a sub-accountant, he renders to the pay officers the proper returns, direct, and is responsible that the money necessary for the weekly payments is transmitted to the medical officers in charge of detachments. He prepares for signature by the Principal Medical Officer, and initials as correct, all correspondence on clothing and equipment. When in charge of general medical stores, his duties are those of our Medical Storekeeper.

At General Hospitals he prepares all the information necessary for the Royal Engineers and the officers in charge of barracks at their inspections to assess damages and deficiencies against regiments or corps whose sick have been treated in hospital, or against those connected with the hospital. He prepares assessments for personal charges for loss or damage to equipment or stores, for the Principal Medical Officer, when satisfied of their correctness, to forward. He obtains equipment and stores as required, and is responsible for the receipt, custody and issue of all articles in the provision and equipment stores, and sees that there is no unnecessary accumulation. He is invariably present when supplies are received, and is responsible that the quantities are correct. The Orderly Medical Officer is responsible for their quality. He is charged with various detailed duties in connection with the hospital library and with damage to the books and other public property, and he prepares certain returns to be rendered by the Principal Medical Officer to the Director

General in connection therewith. At a General Hospital he prepares, initials and submits for the signature of the Principal Medical Officer, all returns (except those made by the Registrar) and requests, except for current supplies. He "takes over" for the Principal Medical Officer the hospital buildings, out-offices and enclosures, furniture, equipment and stores, officers' quarters, and barracks. He is responsible to the Principal Medical Officer for all the stores and equipment held in hospital at large, for the custody and care of all hospital equipment of every kind, and for the care and proper disposal of all the Steward's stores and all the medical stores. In other words, all that burden of detailed medical responsibility and accountability that rests upon our medical officer, the quartermaster assumes. He is the hospital medical storekeeper.

At the larger station hospitals he exercises a general supervision over the subordinate staff, to insure the orders of the medical officers are carried out in their absence, as well as in the performance of duty analogous to what he would do in a general hospital. Where nursing sisters are employed he does not interfere with them, but he makes to the medical officer any necessary report. If required, he assists in the instruction and training of the non-commissioned officers and men, and in every detail of duty and of stretcher drill. He is responsible to the medical officer in charge for the safe custody of the records, books, medicines, instruments and appliances, and for the preparation of the returns and other papers belonging to them. He also discharges many of the detailed duties of the Steward and the Pack-Store keeper.

In the field, the quartermasters attached to the various hospitals and with the Principal Medical Officers discharge duties analogous to those previously described. In particular they are responsible under the medical officers for duty in connection with the payment, clothing and equipment of the personnel of the hospitals, and take charge of the arms, accoutrements and ammunition of the wounded turned over by the bearer companies.

DEPOTS FOR MEDICAL STORES.

Besides hospitals, the medical establishment in the field embraces Depots of Medical and Surgical Stores [Purveying Depots].

[Medical Supply Depots]. The main one is at the base, and is designed to supply all the hospitals with the force, and the hospital-troop and transport-ships. The medical officer in charge is responsible that the stores are protected from the weather, and are arranged so that supplies can be sent to the front without delay. These are renewed by requisition on the Director General, who causes them to be packed so that the repacking at the depot may be at the minimum.

ADVANCED DEPOT.

An advanced depot of such stores is established under a medical officer, assisted by one sergeant-compounder, one corporal as clerk, two privates as storemen; and it is supplied with a tool-chest from the base. He procures by requisition, from the base, sufficient material for the field hospitals and other medical demands at the front. Besides the general supplies, he keeps complete 6 pairs of Nos. 1 and 2 "Reserve" panniers, 12 companions with water-bottles, 24 havresacks and water-bottles, 6 surgical bags for cavalry, and 6 field fracture boxes. All his stores are to be packed in convenient packages, and he must avoid such accumulation as might hamper the forward movement of the army. He files as vouchers, copies of all indents for stores on the base and all requisitions for supplies from the front, and his only book is a Register of Medical Stores and a guard-book [portfolio] with a supply of forms. The book-keeping is thus reduced to a very simple matter, worthy of emulation.

ADMINISTRATIVE MEDICAL OFFICERS IN THE FIELD.

At the base of operations a Principal Medical Officer, under the general there in command and the Principal Medical Officer of the army, has control of all the medical establishments, including the Hospital Ships, and sees that the required duties are performed. All medical officers, soldiers of the Medical Staff Corps, and persons seeking to render voluntary aid, report to or are reported to him, both on arrival and departure from the base. He arranges for the reception into hospital of all patients from the front, and for their future disposition when their hospital treatment terminates there. He is responsible that all vessels to carry invalids are properly equipped,

and that the medical duties connected with the General Hospital Depot are properly carried out. He is the accounting officer for the clothing and equipment of the Medical Staff Corps at the base and on the lines of communication, and his quartermaster attends to their pay, clothing and equipment. He has no stated returns to make, but renders such as the Principal Medical Officer of the army requires. He is assisted by a staff.

With a cavalry or infantry division, the Principal Medical Officer is on the staff and remains with the headquarters of the division, advises the division commander on all matters affecting the health of the division, and receives and transmits his orders and those of the Principal Medical Officer of the army. The medical officers and the Medical Staff Corps within the division are subject to his orders and are at his disposition, and under the division commander he is responsible for the movements and distribution of the companies and the hospitals at all times. He is the accounting officer for the clothing and equipment of the Medical Staff Corps in the division field hospital and the bearer companies, and his quartermaster takes charge of such papers. He makes all reports on hospital establishments to the division commander and to the Principal Medical Officer of the army, and sees that medical officers attached to regiments do not encumber their commands at the front with sick. He carefully guards the field hospital from being overcrowded, keeps up a system of removal to the rear, but does not allow men likely to be effective soon to go there. When called upon, he supplies the division general from nominal rolls with the names and regiments of men sent to the rear. He keeps the Principal Medical Officer informed of the number and description of the sick and wounded requiring transportation, with the character and amount of the carriage. When an engagement is expected he arranges with the division general, and points out to the medical officers commanding bearer companies, or in charge of field hospitals, suitable positions for stations and hospitals, and will satisfy himself that their parties are equipped and the arrangements made. In the absence of the division commander he acts on his own responsibility. When his

division is detached he acts as if he were the Principal Medical Officer of an army.

The Principal Medical Officer of the division, or a medical officer detailed for the purpose, will accompany the staff officer appointed to select quarters, hospitals, or stables for troops, and will examine them as regards cleansing, drainage, ventilation, lighting, water supply, cubic contents, and all matters likely to affect the health of the troops. He will advise the chief staff officer on all such subjects, and will send copies of all his reports to the Principal Medical Officer in the field. He will point out defects requiring remedy, and will state the number of troops or of sick that can be accommodated safely in the buildings. He also examines the sanitary condition of towns and villages about to be occupied, and their neighborhood, and will make such recommendations as he may think necessary for the health of the troops. In selecting a site for an encampment, the Principal Medical Officer will accompany the staff officer, and will give his opinion, in writing if deemed necessary, on the salubrity or otherwise of the proposed position, with recommendations respecting the drainage, preparation of the ground, the distance of the tents or huts from each other, cleanliness of the surrounding ground, ventilation, water supply, position and regulation of the latrines and slaughtering places, disposal of refuse, burial of the dead, and disposal of carcasses. In connection with the staff officer concerned, he will examine and report upon the amount and quality of the water supply, point out its best source, and indicate precautions for its cultivation and care. He will superintend the sanitary arrangements of the camp and of occupied towns; will see that the surface and vicinity of the towns and camps are kept clean and free from nuisances, that defects of surface drainage are remedied, the dead interred and the offal properly disposed of, latrines are properly regulated, and that the purity of the water supply is preserved. He will keep himself informed as to the sanitary condition of the hospitals, huts, tents, houses, &c., and will recommend such precautionary measures as he may see fit for the prevention of disease, and will report to the chief staff officer defects and negligence in the discharge of sanitary duties in the camp.

The Principal Medical Officer of the division will make a daily inspection of the camp and will especially inform himself as to the health of the troops. On being informed of the presence of disease, he will examine into its cause, ascertaining whether it proceeds from or is aggravated by defects in drainage, cleansing, nuisances, overcrowding, want of ventilation, bad or defective water supply, dampness, marshy ground, or any other local cause; or from bad or deficient food, intemperance, unwholesome liquors, fruit, defective clothing or shelter, exposure, fatigue or other general cause. He will report to the chief staff officer on such causes and the measures he proposes for their removal, and will send a copy to the Principal Medical Officer of the army. He will also report daily on the progress or decline of the disease, and on the means necessary for the removal of its causes, until it becomes no longer necessary to do so. When on the march, the Principal Medical Officer of the division, or a medical officer specially appointed by him for such duty, will accompany the staff officer who precedes the troops, to collect information on medical topography with reference to sites to be selected or avoided. During epidemic seasons he will indicate the best means to mitigate or prevent the attacks of disease on the march.

These minute directions have been transcribed almost verbatim from the regulations, in order that by their detail it may be seen how much importance is attached to the duty, and what care is taken that the use of general terms shall give no excuse to medical officers to omit, or for others to interfere with any part of these important functions. They also show how these hygienic considerations, which formerly were practically ignored, are now recognized in connection with the efficiency of the active forces.

The Principal Medical Officer of the division sends a Daily Consolidated State [Report] of the Sick and Wounded in the field hospitals under him to the division commander, for his information and for that of the commanding general of the army, and to the Principal Medical Officer of the army. He prepares a weekly Sanitary Report on the state of the division, to be sent to the Principal Medical Officer of the army for the information of the commanding general, and a copy of this is transmitted by the Principal Medical

Officer to the Director General. He furnishes the Principal Medical Officer of the army full information as to the sanitary state of the troops and hospitals, at such intervals as the latter may direct. He also sends the Principal Medical Officer of the army a consolidated descriptive numerical classified return of wounds and injuries, together with the results of operations, and the originals from the field hospitals, for transmission to the Director General.

No provision is made for a Principal Medical Officer of an Army Corps as a fractional part of an army.

The Principal Medical Officer of an army is assisted by a staff, and in the field has his headquarters with the general officer commanding the lines of communication, but he will be available for consultation with the general-in-chief, whom he will advise in writing in reference to rations, clothing, shelter, sanitary arrangements and precautions for preventing disease, and on all other subjects bearing on the health and physical efficiency of the troops. Under the orders of the general commanding the lines of communication he will have the supreme control of and be responsible for all medical arrangements and establishments connected with the force. He will advise and carry out the orders of the general-in-chief in all medical matters connected with the movement of troops toward the front, of sick and wounded toward the base, and the transport of medical supplies. He will send to the Director General, at such intervals as the latter may determine, full reports concerning the hygiene of the army, with such recommendations for improving it as may be considered requisite. He will inspect the whole of the hospital establishment of the army. With the approval of the general commanding he will decide, according to the supplies obtainable, the scale on which the hospital diets shall be issued. He will keep an adequate advanced depot of medical stores within easy reach of the field hospitals. On receiving from the Principal Medical Officer of a division intimation as to the number and class of cases to be evacuated from field hospitals, he will detail, from the staff of the hospitals on the line of communication, medical officers and attendants to accompany them toward the base, and will see that sufficient provision for supplies on the

road is made, and he will at once arrange with the general officer commanding the line for their transport, specifying as far as possible the amount and kind of carriage required. Notwithstanding the direct and enviable authority that the Principal Medical Officer exerts over all branches of the Medical Department, it appears from this that he has no transportation, except the limited amount attached to the field hospitals, that he can call upon. The absence of an adequate ambulance train seems a serious defect.

Besides forwarding such returns as he receives for the purpose from the divisions, the Principal Medical Officer sends a consolidated daily state of sick and wounded to the Commanding General. He keeps a diary of all medical, sanitary, and statistical matters of interest connected with the proceedings of the force, and communicates them from time to time by letter to the Director General. At the termination of the campaign he furnishes the Director General with a general return of the casualties and sickness of the force.

VOLUNTARY ASSISTANCE.

The difficult and delicate questions connected with philanthropic assistance outside of the permanent military organization are regulated thus: All the medical officers of the Auxiliary Forces, civil surgeons, nursing sisters, and others rendering voluntary aid, whose services are authorized by the General Commanding on the recommendation of the Principal Medical Officer of the army, will be placed at his disposal for duty in hospitals on the line of communication and at the base, at such places and in such ways as he may deem expedient. They will act under the medical officer in charge of the hospital in which they do duty, who may suspend from duty any guilty of misconduct or disobedience, reporting them to the Principal Medical Officer, who will take such further steps as necessary. Representatives of Aid Societies must place at the disposal of the Principal Medical Officer their staff of surgeons and attendants, and all supplies brought by them, for distribution to hospitals. The Principal Medical Officer will assign duties to all such volunteers, and the representatives of the

societies will have no power to remove or re-distribute their staff without his express sanction. All supplies of any kind, by any aid society or others, for hospital use, he will cause to be distributed by the representatives to such hospitals as he may name; but such supplies shall not be introduced, used, or issued except by permission of the medical officer in charge. No civilian is allowed to visit any hospital except on the pass granted by the medical officer in charge. This regulation will be appreciated and envied by all medical officers who are cognizant of the wasteful and often demoralizing prodigality of aid societies, and of the incompetent intrusion that, intermingled with valuable aid, embarrasses active military service. Any popular war will find the volunteer army that must prosecute it flooded from the rear with patriotic gifts and overrun with enthusiastic helpers. It is much better that the channels into which these streams should flow, and the limitations that they must respect, be defined at first, than that there should be an effort, liable to be ineffectual, to concentrate operations already wide-spread and independent.

FIELD INSTRUCTIONS.

The Principal Medical Officer in the field, with the sanction of the Commanding General when a campaign opens, or whenever else it seems necessary, will issue those instructions regarding sanitary measures for protecting the health of the troops that he may consider requisite for the guidance of medical officers.

I had the opportunity of examining such instructions issued in the Suakin Expedition, and I introduce extracts from them partly to show their general scope and partly because of their intrinsic value. I very much regret that I failed to note the name of the officer who prepared and issued these valuable memoranda.

“Enteric Fever.

“A safe rule is to treat all cases of camp-diarrhoea with elevated temperature as enteric fever. In warm climates and field service this fever does not invariably conform to the temperature ranges of medical authors.”

“Water.

“Preliminary hygienic examination of water can be made in half an hour, including color, taste, odor and clearness. Organic matter may be estimated by boiling with gold terchloride: putrescent matter is tested by potassium permanganate; chlorine by nitrate of silver; calcium by ammonium oxalate. A concentrated solution of nitrate of silver applied to water and exposed to bright sunlight, by comparing the darkening in rapidity and depth with distilled water similarly treated, is a good test. A very portable leather case holding the necessary chemicals is easily arranged. Alum is a very efficient means of removing suspended impurities, at the rate of 6 grs. to the gallon, standing 10—12 hours. Brackish water is best for cooking, or as a vehicle for food requiring some salt. An efficient filter may be made of a tin can, with clean sand and linen or flannel. Charcoal is a good purifier of organic matter.”

“Density of Population.

“At the rate of 12 men to a tent, the density of population in camp will be:

For one tent every	50 sq. yds.,	96.8 men,	or 1161.6 per acre.
“	“ 100	“ 48.4	“ 580.8
“	“ 400	“ 12.1	“ 145.2
“	“ 1000	“ 4.84	“ 58.

The composition of the field ration for that expedition is then given:

“Bread 1 1-4 lb. or Biscuit 1 lb.; Meat, fresh 1 1-4 lb. or preserved 1 lb.; Tea 1-3 oz.; Coffee 3-4 oz.; Sugar 2 1-2 oz.; Salt 1-2 oz.; Pepper 1-36 oz.; Potatoes, or fresh vegetables 12 oz., or compressed vegetables 1 oz.; Jam or marmalade, occasionally; Erbswurst, 2 oz. occasionally; Lime juice, 1-2 oz.; Sugar 1-4 oz.; Rum 1-16 oz. when ordered.”

The details of this ration differ from those of the standard field ration, especially in that the fresh meat and vegetables are increased, erbswurst is introduced, and the rum when allowed is greatly reduced.

“Lime juice should be issued daily with preserved provisions, and invariably when there are no fresh vegetables.”

The following list of Medical Comforts, resembling our Hospital Stores in their purpose, is then given:

"Brandy, Port, Champagne, Claret, Tarragona, Ale bottled, Porter bottled, Milk condensed, Extract of Meat, Essence of Beef, Hospital Biscuit, Arrowroot, Sago, Cocoa and Milk, Cocoa peptonized, Scotch Barley, Oatmeal, Mustard, Soups, Fowl, Preserved Potatoes, Pickles, Jam and Marmalade, Moir & Sons' rations (meat, gravy, vegetables and pickles, mixed)."

This was succeeded by a list of the clothing issued for the campaign, viz.

"1 serge frock, 1 serge or tartan trousers, 2 frocks Khakee drill, 2 trousers Khakee drill, 1 pr. ankle boots, 1 helmet, 1 veil, 1 back pad (spine protector), 1 pr. goggles, 2 flannel belts, 1 clasp-knife and lanyard, 1 tin of grease, 1 housewife, 1 blue worsted cap, 4 pieces yellow soap; also 1 pr. ankle boots, 1 great-coat without cape, 1 forage cap, 1 kit necessities field service."

A list of that kind in the possession of every medical officer keeps him informed not only of what the Medical Staff Corps soldiers should have, but also exactly how every man of the force is protected from the climate.

Dead Animals.

"The lungs of slaughtered animals should not be thrown overboard from floating slaughter-houses. On land, tie the hind legs together and drag to the leeward of a sand-hill and bury. If there is not time, bury the viscera and make a fire of rubbish within the trunk. Or make several stabs for the free escape or exit of gases."

General Suggestions.

"If the men are employed early in the morning or late at night they should have a ration of hot cocoa and milk or tea or coffee.

"Prompt aid to the wounded depends on good field organization and administration by the Medical Department. While in wars with artillery and arms of precision the wounded must be carried to the hospital, in such a war as this a section of the Field Hospital and a part of the Bearer Company may be brought well to the front, when the wounded may be carried thither without the risk of a hurried application of first aid. The application of first aid to gunshot is superfluous and may be mischievous, for it has to be cut off at the first dressing station. Hence in bullet flesh

wounds do not probe, finger, wash or disturb in any way, but keep the wound at rest and if necessary use morphia.

"In Egypt in 1882 this was done with advantage: Garments ripped or cut; wound and skin well cleansed with carbolic acid 1:20; *lightly sprinkled* with iodoform powder; covered with "protective" (oiled silk) dipped in carbolic solution; covered with a couple of layers of boracic lint, and fixed with gauze bandage.

"When there is extensive injury of the bone or other parts, especially of a joint, do as little as possible beyond covering with antiseptics, enforcing immobility, and removing to hospital for deliberate dressing.

"Antiseptic Solutions.

- "1. Corrosive sublimate.....dr. 4
Glycerine.....oz. 6
Alcohol.....oz. 4

"POISON—One ounce to 2 1-2 pints of water.

- "2. Carbolic acid for syringing.....1:20
Carbolic acid for dressing.....1:40

- "3. Chloride of zinc.....40 grs. to 1 oz.

"After amputation, mix one of zinc with three of carbolic solution 1:40 and apply to the flaps. Styptic and antiseptic.

"4. For a suppurating gunshot track, use a drainage tube, syringe with iodoform 10—15 grs., carbolic solution 1:20 1 oz. Stir and inject with a syringe.

"Used in Dresden civil hospital in one year for 1,527 surgical cases and 300 important amputations without infective wound disease occurring, as follows:

"Corros. sublim. 1:1000 for dressing wounds. Good results 1:10,000. Antiseptic gauze made by impregnating gauze in a solution of sublimate 10, alcohol 4490, glycerine 500. Suture silk boiled one hour in 1-2 per cent. solution of sublimate. Catgut, by placing catgut 24 hours in 1-2 per cent. solution of sublimate and keeping in alcohol. Operation sponges are kept in a solution of 1-2 per cent. sublimate in water.

"Antiseptic solution for dressing wounds:—Camphor, 1 scruple; Glycerine, Alcohol, each 1 oz.; Water to 16 oz.; Cor. Sub. 3 1-2 grs. (1:2000). Moisten lint, cotton, or dressing with this, and prevent evaporation by impermeable material."

"Medical Assistance in the Field.

"1 medical officer to a regiment of cavalry or infantry (servant from the ranks of that corps and baggage carried by regiment). 1

corporal and 1 private from the regiment. 1 pr. field panniers, medical; 1 field companion with water-bottle; 1 surgical havresack with water-bottle; 1 circular tent for surgery.

"For battery, troop or detached company: 1 medical officer; 1 private from the corps; 1 field companion with water-bottle; 1 surgical havresack with water-bottle.

"Each medical officer is to have a copy of a hospital diary or ward book (Bk. 39) but not required to furnish any return of sick; but he must see all the sick with the company sick reports before they go to the field hospital."

The hospital is supplied with blankets, bolster cases, and waterproof sheet, but not with bedsteads or paillasses.

Returns Required.

"Daily, each field and other hospital to P. M. O. (A. 29).

"Daily, consolidated of above from P. M. O. to Commanding General. (A. 28).

"Weekly, from every hospital to P. M. O. of army, and duplicate to Director General.

"Special, as called for by P. M. O. (Forms A6, A7).

"Reports, as called for by P. M. O's.

"Weekly sanitary, by Sanitary Officer to P. M. O.

"Periodical, by P. M. O. to Director General in every matter connected with health, hospitals, supplies, personnel, &c.

"Nominal rolls of sick and wounded sent from front to base (I. 1225) accompanied by medical certificates.

"A copy of every nominal roll is kept by the P. M. O. Force, for reference for tracing. The other goes with the men to the base for filing in the General Hospital. The disposal of every man en route or at the terminus is noted in the remarks."

This is not a complete copy of the instructions, but it is sufficient to show their tenor and to illustrate how useful such a compilation of important points may be to inexperienced officers. Similar attention to officers taking the field is not unknown in our service, but it is not specifically provided in the regulations, and I know of no case where it has succinctly covered so many points.

ENGLISH AUTUMN MANEUVRES.

During the stay at Aldershot the Autumn Maneuvers of the First Army Corps were carried on for a week twenty or more miles away. I did not see these, because it appeared that the special con-

ditions that I should be expected to observe would not occur. The Medical Department was represented there only in the most elementary form. To the 14,000 troops, concentrated in two opposing camps, four medical officers were assigned, whose time was engrossed by the daily "inspection" [sick call]. They examined, as well as possible, those applying, and sent back by rail without delay to the permanent hospitals at Aldershot, all who did not seem able to keep up with their comrades in the not very arduous service required. Except in that meagre form there was no Medical Department with the contending divisions, to the best of my information. Principal Medical Officers, hospital trains, field hospitals, bearer companies, even battalion medical officers and regimental bearers, all were absent. Naturally, I did not inquire too curiously into the cause of the failure to utilize such an opportunity for practical work, but I believe that the Medical Department was not responsible. In the German service there are, at least annually, field operations on a large scale where company bearers, dressing stations, field hospitals, and all the machinery of active service are brought into play.

Drill and practice in methods are as desirable for ambulances as for caissons, and the careful removal of suppositious wounded should have an equal drill value with the formation and movement of imaginary lines of attack and defence. As another has said, the objection of expense sometimes urged against the field operations of the Medical Department is never efficient against artillery and small arms practice; and it may be added that the equipment of the one would thereby be tested, rarely destroyed, while the ammunition of the other is expended, if not wasted. Modern wars are too sudden in their onset to allow the Medical Department, which in the nature of the case has few current opportunities, to await for its mechanical training the pressure of immediate service.

THE ARMY MEDICAL SCHOOL.

The Army Medical School is established at Netley, on Southampton Water, in connection with the Royal Victoria Hospital; but it has a distinct and independent existence under the Secretary of State for War, and is governed by its own Senate. The Senate con-

sists of the Director General of the Army Medical Department, the Physician to the Council of India, the Professors of the School, and the Principal Medical Officer at Netley. The Senate regulates and decides all matters of instruction and discipline, prepares estimates for expenditures, and has a general care over the school. It meets once in three months, or more frequently if necessary.

The Army Medical School, really the fruition of Robert Jackson's far-reaching scheme* was the immediate outcome of the Royal Commission of 1857 that inquired into the sanitary condition of the army; an inquiry consequent upon the developments of the Crimean War. The Commission recommended such a school, where "the specialties of military medicine and surgery, hygiene and sanitary medicine might be taught to the young medical officers of the army," and the institution was established in 1860 at Fort Pitt, Chatham. It was transferred to Netley in 1863, when the Royal Victoria Hospital was opened there. The province of the school is to supply supplementary and special instruction suited to the requirements of the military service, and it very admirably discharges that function. There are four professors, who may be appointed from civil life or from the active or retired medical officers of the British or the Indian army. The appointments made since 1882 are for seven years or less, and are renewable for one term. The chairs are those of Hygiene, Clinical and Military Medicine, Clinical and Military Surgery, and Pathology. There is one Assistant Professor, detailed from the medical officers of the army, for each chair.

The Royal Victoria Hospital is a General Hospital especially designed to receive soldiers invalided from abroad, and has a nominal capacity of 872 beds. It is only exceptionally filled, but under pressure it is capable of receiving more than that number of patients. It has two divisions, a medical and a surgical, and in it the surgeons on probation obtain a practical acquaintance with the administration of military hospitals. To that end they are distributed in immediate charge of the different wards under senior medical officers. They are required to prepare personally all the ward papers and books, and specimens of the more important ones necessary in the hospital at

* "The Medical Department of Armies," London, 1805; pp. 76 *et seq.*

large, to care for their patients, and to learn thoroughly the principles of nursing and of sanitation. The manner in which all this is done is scrutinized at the time, and is made the subject of grading at the examination. They are individually and collectively carefully taught in these technical matters, and also in all that pertains to the invaliding or other disposition of soldiers, both by precept and by concrete examples. They also receive formal instruction in the principles and administration of military law, in anticipation of duties that as detachment commanders they might otherwise reach without preparation. They go on duty in rotation as Orderly Medical Officer [Medical Officer of the Day] and they receive practical instruction in the school of the soldier and in stretcher drill, acting as bearers, an hour each day. All these technical matters are carefully and persistently taught, and they consequently go forth in a body uniformly trained and in close official relation with the method of preceding and succeeding classes. The great advantage that this is to the public service, whether the young officers go out to independent stations or as subordinates with seniors, is too palpable to require demonstration or remark.

The instruction in surgery and in medicine is in part clinical and in part didactic. The professors have control of the wards sufficiently to use them for all clinical purposes, and the cases may illustrate the lectures or be the subject of special exposition. The lectures, given once each week in each of these branches, have exclusive reference to military surgery and to the diseases, especially the tropical diseases, to which British soldiers are most liable, as modified by the conditions of military service in different countries. The influence upon physical health, the advantage of frequent inspections in unhealthy seasons, and the importance of "invaliding," or change of climate, in maintaining the efficiency of troops in hot or sickly regions, are dwelt upon. There is a special course of lectures on lunacy, by the officer in charge of the attached Lunatic Hospital. This embraces the importance and the methods of eliminating imbeciles and those likely to become insane from applicants for enlistment, the study of the special arrangements of lunatic hospitals, examination and diagnosis with particular reference to feigning, the

medical and other treatment of such patients, the selection and instruction of attendants, the military regulations affecting insane soldiers, and the legal relations of insanity. All these features are illustrated clinically as far as possible.

The instruction in military surgery involves a description of weapons and missiles used in war, a discussion of the laws of projectiles, of their passage through resisting media, and their action on the human body. The primary and consecutive treatment, antiseptic and operative, of gunshot wounds is developed. Medical field organization, including equipment, transportation and hospitals, is explained in detail. The lectures are illustrated by specimens and models from the School Museum.

The examination of recruits is taught by lectures and demonstration; and, in order to assist in an understanding of this important duty, during one week of the course all the applicants for enlistment in that military district are sent by the commanding general to Netley. Those men are examined in the presence of the class, and both the principles and practice of recruiting are carefully illustrated.

Optometry is taught by lecture and demonstration, to show how the vision should be tested for military fitness, and its principles are explained.

Pathology is taught at Netley in the lecture room, the mortuary, and the laboratory. The lecture course covers so wide a range that only selections from the whole are possible at any one session. The general subjects are the influence of micro-organisms, immunity, urinary analysis, age, development, and the geographical distribution of disease. The special subjects are the climatic conditions of the principal foreign stations, and the pathology and morbid anatomy of their prevailing diseases. These are illustrated by specimens from the museum. One lecture is given each week, and laboratory work is carried on twice a week. Attendance at autopsies and work in the pathological laboratory are required of all the class. Three surgeons on probation perform the post mortem examinations in turn under the Professor, and the officer in charge of the case reads the history before the examination and takes notes of the latter to

insert in the case-book and in the hospital necrological register. One of the post mortem examinations is made a subject of final examination. A microscope and other appliances are furnished each surgeon on probation for his use during the term, and very careful and graduated instruction therein is given him. The theory and practice of the microscope, to include ordinary clinical work, are explained; and this is followed by practical work by the officer under the supervision of the Professor or his Assistant. Methods of preparing pathological specimens and of doing ordinary histological work are also taught. The student-officer also learns the principles of bacteriological research, to include staining and mounting, sterilization, cultivation, attenuation, and the characteristics of the more important pathogenic bacteria. Besides the work of instruction, the laboratory staff are constantly carrying on original investigation in connection with the service. At the time of my visit a careful study was being made of the pathology of the obstinate and obscure febrile disease commonly known as Malta or Mediterranean fever. From the clinical history there appeared a close resemblance to, if not an identity with, the irregular and serious disease found in our Southern States, that we regard as a malarial remittent, but which has some resemblance to enteric fever, and is especially insusceptible to the influence of quinine.

Military Hygiene is taught by means of two lectures and three hours' laboratory work a week, so as to explain the principles on which preventive medicine is based in both the scientific and the practical aspect, with special reference to the health of the troops in barracks and in the field. The latest edition of Parkes' Hygiene is the text book, and the course treats especially of soil, water, air, sewerage, food, habitations, exercise, clothing and equipment, climate and meteorology, vital statistics, military service, foreign stations, disinfection, the disposal of the dead, and the direct prevention of disease. The laboratory instruction, which is chemical and microscopical, necessarily expands and develops that of the lecture room in explaining the processes. There the instructor first describes in detail the process employed, and then makes a demonstration of the method. Every student is supplied with a desk and apparatus

and reagents, and is required to repeat each experiment frequently enough to become familiar with and accurate in the work. The range of practical instruction includes the examination of water, air, and food. Its character is best shown by citing from recent examination papers these:

27th Jan. 1890; from 11 A. M. to 2 P. M.

1. What are the essential constituents for a diet for ordinary work, and in what proportion must they be supplied? State briefly the functions fulfilled by each constituent and how far one constituent may replace another.

2. Mention the different methods for the disposal of sewage, and discuss any one of them in detail.

3. On what principles must disinfection be based? State what you know of the action of any *three* disinfectants you select, and what are the limits of their usefulness.

4. What is the usual length of marches? Define a *forced* march. Given a man weighing 10 3-4 stone; his clothing, rifle and haversack, 47 pounds; how much work in *foot-tons* has he done in marching 12 miles at the usual rate—the gradient of the road being 1 in 150? Is this excessive?

23d July, 1890; from 11 A. M. to 2 P. M.

1. State the sources of impurity generally found in potable water. What are the circumstances connected with a water-supply that favor lead poisoning? What quantity is poisonous, and how would you proceed to detect its presence?

2. How do you calculate the amount of air required to ventilate a room in which 12 men, working hard, are employed? What would be a suitable size for such a room in order to secure proper ventilation?

3. State the measures you would adopt to prevent the spread of cholera, enteric fever, and epidemic dysentery.

4. Mention the chief methods generally adopted for the disposal of sewage, and describe any of these methods in detail. State what, in your opinion, would be the most suitable for a standing military camp in a tropical climate.

28th July, 1890; from 11 A. M. to 2 P. M. Practical Examination.

I. Examine the sample of water before you, as follows:

A. Physical character.

B. Chemical analysis

1. Qualitative (except magnesia).

2. Quantitative, viz.:

(A) Chlorine.....in parts per 100,000 and in grains.

(B) Nitric acid.....in parts per 100,000.

The water, caustic soda solution and aluminium foil have been put into the retort and left sufficiently long for the experiment.

The free ammonia is 0.0097 centigrammes per litre.

The nitrous acid is 0.0687 " "

II. Determine the fat (by Vogel's process) and the lactine in the sample of milk.

N. B. The whey is already prepared and diluted ten times.

The solids are 11 per cent. and the ash 0.5.

Give your opinion upon the milk.

III. Examine microscopically and describe the contents of one of the packets.

N. B. Note the number of the packet.

26th Jan. 1891; from 11 A. M. to 2 P. M.

1. Under what heads may nutritive substances be classified?

What is the average chemical composition of each class?

State the amount of each required by a soldier during (a) ordinary work, and (b) hard work.

2. Upon what principle does natural ventilation depend?

Explain Montgolfier's formula, and give an example. How far can it be relied on?

3. Enumerate and briefly describe the different diseases of animals which render their flesh unfit for human food? How far can they be severally identified in meat on ordinary inspection?

4. What is the "dew point?" How can you calculate it, and having ascertained it what further information can you calculate from it? Describe any form of the hygrometer?

As will be observed, the examination is both written by papers, and in the laboratory, and the same is the case in pathology.

The time given to hygiene, and the care taken in its instruction, are fully warranted by its importance, and in my judgment to teach the subject in this way would be a sufficient reason for the support of such a service school, which is really a special Post-Graduate

College. The examination papers show what may be reasonably expected of men who have had no previous special training in this field, and thus become an index of the care and thoroughness with which the instruction is carried on.

The laboratories of both pathology and hygiene are open for voluntary work at all reasonable hours, in addition to the time required to be spent there, and are freely used.

At the close of the session the reckoning is made up by the written examinations held by each professor in the subjects that he has taught, by the practical examinations in hygiene and pathology, by test cases in medicine and surgery, and by the way official records have been kept. An unfavorable estimate of professional aptitude, independently of professional attainment, may be made the basis of a special report condemning the candidate.

The possible maximum of marks obtainable at Netley is 3500, thus:

Written Examination, Medicine.....	500	
Case Books, "	300	
Test Case, "	100	
	—	900
Written Examination, Surgery.....	500	
Case Books, "	300	
Test Case, "	100	
	—	900
Written Examination, Hygiene.....	600	
Water Analysis, "	200	
Meteorology, "	100	
	—	900
Written Examination, Pathology.....	500	
Microscopic Drawing, "	50	
Practical Microscopy "	150	
Bacteriology "	100	
	—	800
Aggregate	3500	

Each surgeon on probation must attain at least one-third of the maximum in each in order to pass. The marks gained at Netley are then added to those obtained in London in each case, and the relative standing of the candidates is thus finally settled.

The successful candidates are then sent to Aldershot for further

military instruction. The Indian candidates do not go to Alder-shot.

At Netley two professional libraries are practically at the disposal of the professors and students. One belongs to the School as such, and is supported by an annual Government grant; the other is maintained by voluntary contributions by the medical staff. These are contained in communicating rooms, and may be regarded as in some measure complementary to each other. They have about 6000 or 7000 volumes in the aggregate, and include valuable series of professional periodicals. The collection is a good general reference library, but is without sufficient shelf-room.

Another part of the teaching machinery of the school is its museum, which consists of four practically distinct sections. The first is a fair mineralogical and natural history cabinet, but is not especially adapted to teach comparative anatomy. There is a supplementary collection in the hospital, largely the gifts of medical officers abroad. The second is a pathological collection of about 4000 specimens, chiefly wet and illustrating disease, although gunshot fractures are fairly represented. It is valuable, and an excellent descriptive catalogue of it, by Sir William Aitken, was passing through the press at the time of my visit. There is also a collection of between 700 and 800 human crania, chiefly normal, from all parts of the world. The third is, roughly speaking, an interesting series of instruments of warfare, of surgical field equipment, and of specimens and models of transport and of hospitals. This includes a classified collection of weapons, of which some are interesting curiosities, such as the flint arrow- and spear-heads of pre-historic man, from the gravel beds of St. Acheuil, Amiens; but in general they represent historically the wars of Great Britain in various quarters, chiefly uncivilized, of the world. There are also numerous projectiles extracted from patients, that show the effect of impact; an exhibition of large and small shot, entire and in section; and a small series illustrating the effect of bullets upon glass, clothing, and other materials; Models and specimens of means of transportation for the sick and wounded, samples of surgical field equipments, and a tolerably large set of first-aid dressings that il-

illustrate chronological changes in this respect, are parts of the whole. The earliest example of first field dressing in the British army was during the Crimean war, when each man received a small piece of lint with a roller bandage wrapped around it. The section of hygiene, or the fourth, contains specimens of soil taken from various military stations, samples of vegetable food grown at home and in the colonies and foreign possessions, medicines used in the army, with each of the foregoing groups conveniently arranged; apparatus for showing the passage of air through masonry, sections of ventilating apparatus, examples of drain and sewer pipes, models of earth-closets, and illustrations of accoutrements and of military clothing, especially of hats and shoes. There are also models of various hospitals, afloat and ashore.

But these useful and interesting collections are deprived of much of their value by the totally inadequate apartments to which they are condemned. Officials who know where to find them can bring out specimens to illustrate lectures, but it is quite impossible to study the most of them, or even to see them fairly, *in situ*. The museum is more than an exhibition or show of curiosities; it is a valuable part of the teaching appliances of the school, and it deserves rooms and cases properly lighted and arranged for its display.

There is a very convenient general lecture room for the school, and upon its walls is a large relief map of India, exposing at a glance the topography of that empire.

Among the memorials of the past that are found in the Museum, is a striking indication of the poverty of equipment that marked the Crimean war, and from which, in a time relatively short, so great an advance has been made. It is the model of an operating tent, where the table is the ground that has been left in the centre by excavating the earth around it. The earthen floor of the tent is thus below the level of the ground outside, and the table is the rectangle of soil left in place for the purpose.

In examining the various examples of transport for the wounded, I saw nothing to be advised for introduction among our material, nor for our conditions anything that for comfort and economy of force approach the travois and the Baily litter.

To return to the Class. Those finally accepted are sent to Aldershot as officers of the Medical Staff. And it is rare that one who reaches Netley does not graduate from it, the exceptions when they occur being on account of some infirmity of character that shows itself.

At Aldershot, as already explained, are the depot and the training school of the Medical Staff Corps. There these officers become occupied with the practical study of military duty. At first they are put into the ranks along with the recruits, until they have thoroughly mastered squad drill; they then are drilled together by sergeants in the infantry company drill, and in all the details of bearer drill. This not merely in charge of detachments, but in doing the work themselves, so that they may be perfectly competent to act as instructors. The instruction involves work with stretchers, with ambulances, and with mule-litters. The animals are harnessed and unharnessed by the officers, and the instruction is perfectly practical. For the first month this occupies three hours a day and afterward two hours daily. Included in this time are hours when very wet weather forbids out-door work, that are utilized for instruction by lectures upon the duties of medical officers in the field. These lectures explain the equipment and management of base and intermediate hospitals and of bearer companies, the field work of the Medical Department, the arrangement of the collecting and dressing stations and of field hospitals, and the duties of a medical officer on the march and in action. The actual pitching of tents and the establishment of a field hospital is a part of this instruction. A special practical course is delivered in the latter part of the term, in hours obtained by shortening parades that officers attend, in the use of Esmarch's triangles and other extemporaneous field dressings. Another hour a day is occupied with lectures on the regulations, and an explanation of the forms required in the management of a company or detachment of the Medical Staff Corps, including the supply of clothing, rations and pay; upon the principles of discipline and a study of the military code, as applied to the minor offences that are taken cognizance of by the company and regimental or depot commanders; and practical instruction is given in the var-

ious forms of inspection, on parade and in barracks. These officers take their tours as orderly officers [officers of the day] in charge of the camp and the guard, and they make all the military reports thus required.

The following form of report required from the Orderly Officer is supplied him to be copied, not to be filled out, and it is accompanied by instructions:

From.....
To
The Officer Commanding De-
pot M. S. Corps.
Aldershot, ..., 1891.

Sir:—I have the honor to report that from reveille yesterday to reveille this day, I performed the duties of orderly officer.

I inspected the rations and found them good [or otherwise].

I inspected the cook house at the dinner hour.

I visited the barrack rooms at the meal hours. There were no complaints [or otherwise].

I visited the Canteen and Recreation Room during the day.

I turned out the guard once by day and once by night. The guard-room was clean and regular, the guard correct, and the sentries alert and acquainted with their orders [or otherwise].

I inspected and marched off the piquet at retreat.

I collected the reports and inspected the staff parade at tattoo.

The Barrack Orderly Sergeant reported to me that all lights were extinguished at "lights out."

I have the honor to be,

Sir,

Your obedient servant,

.....Surgeon.....

Information for Orderly Officer.

Rations, - - 7:30 A. M.	Tea, - - - 3:40 P. M.
Breakfast, - - 7:40 "	Retreat, - - - 6:55 "
Guard by day, - 12:30 P. M.	" after 1st Sept. 6:25 "
Cook House, - 12:35 "	Tattoo, - - - 9:55 "
Dinner, - - 12:40 "	Lights out, - 10:15 "
Recreation Room, 12:45 "	Guard by night, - 10:45 "
Canteen, - - 12:50 "	

The Orderly Officer will on Friday take Fire Screen Practice at the Guard Room 12:25 P. M., and on Saturday visit married quarters at 4 P. M. The Orderly Officer will remain in uniform and not

leave Barracks during his tour of duty. He will wear his pouch belt, jacket hooked up, and red striped trowsers at mess.

He will hand his Orderly Officer's report to the Adjutant at Orderly Room.

By order: (signed) GEO. E. TWISS,
Surgeon Captain,
Adjutant Depot M. S. Corps.

To return to the daily duties of the newly-appointed medical officers: Another hour is devoted daily to equitation. The class is broken up into squads of five or six, which are distributed among the various excellent riding schools of the Aldershot camp, under the personal instruction of the military riding-masters. While it is, of course, impossible in so short a time to make an accomplished horseman of the novice, I cannot speak too highly of the intelligent and patient instruction given to the party whose progress I followed in the riding school of the Royal Artillery, by the riding-master, Captain Pawson, and of the results he obtained. Young medical officers, who had no previous experience in the saddle, during this brief course acquired a seat that enabled them to take an average hedge or ditch without difficulty, and to become sufficiently at home on a horse for all ordinary purposes. Their greater usefulness to the army, to say nothing of the personal advantage to them of such training, is very apparent.

At the conclusion of the Aldershot course a practical and written examination is held, and a certificate of proficiency in riding is required. Those officers who fail in any particular are required to return at their own expense, and to take part in each succeeding course until duly qualified. But failure does not disturb their military standing.

In some respects the courses at Netley and at Aldershot overlap, and exertion is thus wasted. But taken as a whole they both are admirable and are strongly commended for our imitation. Our clinical resources are not such as to enable us to devote a military hospital to the kind of teaching that is given at Netley, but there is not occasion for that. In every other respect it would be a profound advantage for our junior officers to be taught,

systematically and thoroughly, the special requirements that their commissions impose, and not leave them as at present to acquire this information in a hap-hazard irregular way as their natural aptitude, or the want of it, may lead. By devoting the first four months of a young medical officer's life to this instruction, he can be started correctly, or he can determine then, what some discover later, that his vocation is for another career. Practical horsemanship is not merely an accomplishment, but a necessity that should be insisted upon.*

PHYSICAL TRAINING IN THE COMPANY AND IN THE GYMNASIUM.

The great importance of physical development is fully appreciated in the British army. The term "physical training" is limited in the technical sense to the exercise in the company that we still call "setting up," and its motive is said to be to expand the soldier's chest and to develop his muscles. This is divided into nine exercises, and begins with swinging the arms in circles. The next is to bend and stretch the body, then to bend and stretch the arms, then to lunge and engage, next bending and stretching the knees. The sixth exercise is a combination of the second and fourth. The seventh is one of four practices for the development of the shoulder by striking out. The eighth is a union of the fourth and seventh, and the ninth is a combination of the whole. These may be practiced singly or in squads, or by company; and they are adapted to music, whose use is encouraged. For a part of them it is recommended that airs with choruses be chosen and the men are allowed to sing the chorus, and they are encouraged to sing through the whole of the eighth exercise. It is officially set forth that the exercises are not to be carried to the point of fatigue, and that they should be varied and be made very short, to avoid fatigue and lack of interest. This is to be practiced constantly, at all seasons of the year and under all circumstances, up to the age of 35 years.

I give no more minute description, because the whole matter is detailed in the Infantry Drill of 1889, an easily accessible book.

*Since this was written a school for newly-appointed medical officers, which includes equitation in its course, has been organized at Washington.

In my judgment these exercises are better adapted to the purpose of symmetrical development, are simpler and are more attractive to the soldier than our later drill; and since they are good, I see no reason that their foreign origin should bar their adoption. The regulation "attention," which is the point of departure and to maintain which is one of the objects in view, is practically identical in both armies, except that with the English the feet make an angle of 45° instead of 60° as with us. Notwithstanding inferior material, there is no question that the British soldier looks better on duty, and as a soldier is more active than our own. To the systematic gymnastic instruction now in force, which is an amplification and an extension of the physical training proper, they are much indebted for this superiority.

The Gymnastic Instruction is required for all young officers of the line (in our sense of the word) and for the men. There are two principal gymnasia in Great Britain; at Aldershot, and at the Curragh near Dublin. The parent one is at Aldershot. These are employed not only for local use, but for training non-commissioned officers as instructors in gymnastics. A gymnasium is supposed to be in operation at every station. The gymnastic training of the cavalry recruit is carried on simultaneously with his foot drills, and he begins no riding until this course, which lasts two months and must not be interrupted, is finished. It occupies one hour a day. The infantry recruit begins directly after completing his physical training with the company, which usually is one month after joining. The course is an uninterrupted one of six weeks, an hour and a half daily. Recruit officers are to undergo the same course and at the same time, unless found efficient and properly excused. Weak and awkward men are kept under this training for three months, and if below the standard of efficiency at that time they are then to be reported to the Adjutant General.

Besides training the recruits, gymnasia are maintained to harden and strengthen the trained soldier, so that at least he may cover 1,000 yards rapidly and then be in condition for efficient bayonet work. To do this with as little interference as possible with the ordinary military duties. men, according to the size of the gymnasium but not

exceeding one-sixth of the garrison, are to be selected and strictly examined medically. These are then put into squads for attendance one hour on alternate days, not exceeding three months. Guards are not to be interfered with. Men under thirty must attend, but with men over thirty the course is optional, subject to the medical officer's approval. Voluntary classes for advanced work may be formed, but no man may join them until after one month's instruction.

Medical officers serving with regiments that have undergone gymnastic training "will specially report on the effects of such training on the muscular development and health of the men on their leaving the station, and as to the general influence of gymnastics in producing a vigorous constitution." They are to visit frequently the gymnasium and witness the measurements of the recruits on entering and completing the course. The Principal Medical Officer is to refer to the subject in his annual sanitary reports, giving the substance of the information supplied by the medical officers, and his own remarks on the utility of the gymnasium. The gymnasium building at Aldershot is not perfectly adapted, on account of size and some minor matters, for its purpose, but the work done in it is admirable. The apparatus is of the simplest description and the floor may be cleared without delay. Parallel bars, light Indian clubs, light dumb bells, a vaulting horse, inclined ladders and the like are all. Using these, but more particularly using them with care, very capital results are obtained. The young men develop in chest-girth and muscle, the weak gain strength, the awkward agility, and the timid confidence. One side of the room is arranged with very trifling foothold for perpendicular escalading, up which men scale successfully; and at one end of the room is a shelf about eight feet from the floor, which men are taught to reach without other help than they can give one another. The ease with which every exercise is performed is delightful to witness. The impression received in watching these exercises was that men with no special physical gifts were brought up rapidly and without distress into admirable condition, and that their military efficiency was greatly increased thereby. It was evident that the men themselves appreciated and enjoyed the work.

The system used is a modification of the Ling method, developed

by Sergeant-Major Noakes, Chief Instructor of Gymnastics in the Army, known as "Free Gymnastics with Light Dumb Bell Drill." It is practiced on the floor of all these gymnasia, and the company Physical Training closely follows it. The testimony of good observers is that this method improves the carriage and condition better than the older way.

Besides the gymnasium training of the recruits and the older men, there are semi-annual classes at Aldershot and the Curragh of non-commissioned officers to be fitted as Instructors of Gymnastics. These men, sent from various regiments on their own application, are given a more thorough course and develop into skilled gymnasts: but their work, like that of all the rest, is done gradually and without strain. I saw at Aldershot some beautiful examples in the open air of running in fours over obstacles, such as hedges, ditches, along the string pieces of bridges whose floors had been torn up, and scaling high wooden and brick walls. These central schools, sending out classes of Instructors uniformly trained, enable every gymnasium to be conducted in substantially the same manner. And such work as I observed at Dublin seemed animated by the same interest and the same energy.

Before going abroad I saw, in 1891, at the Recruiting Depot, Davids Island, elementary gymnastics taught under unfavorable conditions, in a method so similar to that observed in England that I am confident that the instructor was trained at Aldershot. So simple and efficient a method deserves introduction wherever there is a garrison and a shelter can be found or made.

The whole gymnasium system is directly regulated by an Inspector of Gymnasia, and each Gymnasium is under the command of a Superintendent. An Annual Class of officers for instruction to fill these places is held at Aldershot, which is an additional guarantee of uniformity. Before the men are allowed to commence the course, a strict medical examination is made of each, and his height, chest, forearm, and upper arm are measured in the presence of the Superintendent. These measurements are repeated at the end of the course or when he returns to duty, and the particulars, with

the age and weight of the man, are entered in the prescribed books kept at the Gymnasium. I think the facts justify the official declaration of the character of the exercises, that they "are so arranged that, while the most advanced course is sufficient to test the powers of the strongest, the preliminary course can be performed without injury to the weakest frame."

Besides the general gymnastics, the cavalry recruits are given a course of instruction in fencing, one hour a day for thirty days, and then a course of singlestick drill one hour a day for forty days. Before being allowed to compete for swordsmanship prizes in the riding school, every trained soldier must go through an annual course of singlestick one hour a day for six days. Every encouragement is given to keep up this practice voluntarily, and the instructors are enjoined to pay special attention to the men attending during voluntary hours.

Young cavalry officers on joining are required to take the same course as recruits in these matters; and the same is required of young infantry officers at stations where there are gymnasia. I have seen them at Aldershot under training on the same floor and at the same time as recruits.

A regulation requires the art of swimming to be taught as a military duty at all stations where there are facilities, and at bathing parades the skilled swimmers are distributed as instructors.

Athletic games, comprehended under the general term of "sports," are systematically encouraged in the army. The public competitions are made gala days for the regiments concerned, and military equipment and supplies are provided for the occasion. The sports are looked forward to with interest and participated in with zeal, and the officers and their families and the men of other regiments are present in large numbers as applauding spectators. This wise interest has a most stimulating and healthy effect.

This physical development of the soldier, in whom the fighting instinct is naturally strong, gives to the British army much of the formidableness it possesses, notwithstanding certain deficiencies in the original material and other incidental conditions of the service.

NOTE OF EXPLANATION.

Having been sent to England in 1891 upon other duty, I was ordered also to "make the utmost use of such facilities as may be granted to study the British military hospitals, the Army Medical School, the duties of the Medical Officers, the Sanitary administration of Barracks and Camps, and particularly the instruction and service of the Medical Staff Corps." I was further instructed to "carefully examine the system of Physical Training in the British Army."

The action of the British War Office upon the request of our War Department opened a free way in every direction, and the personal attention of the officers with whom I came in contact was unwearying in making plain those details and minor matters whose comprehension so easily eludes a stranger. To Sir William Mackinnon, the Director General of the Army Medical Department, I am under special official and personal obligations, and by his considerate attention I was able to visit both Aldershot and Netley at the very times when classes of young medical officers were received there. At Netley public quarters, and at both Aldershot and Netley the hospitality of the mess, were extended to me; and to the medical officers at both places, who in every pleasant way made me feel at home, I am indebted for constant, intelligent, and courteous assistance in connection with my work. At all the other places that I visited on duty I was received with the same cordiality, and at Dublin and Chester the Commanding Generals extended personal courtesies as well as official favors. I repeat in this place this acknowledgment of those kindnesses as made in my official report, because it is the only public method in my power to express my appreciation of them.

THE SPECIAL TRAINING OF THE MEDICAL OFFICER,
WITH BRIEF NOTES ON ARMY MEDICAL SCHOOLS
ABROAD AND AT HOME.

[An address delivered before the Association of Military Surgeons of the
United States at Washington, D. C., May 3, 1894.]

BY DR. CHARLES H. ALDEN,

Assistant Surgeon General U. S. Army, Washington, D. C.

The great interest taken by the medical profession of the United States, and especially by the medical officers of the National Guard, in the establishment and work of the Army Medical School in this city, suggests the belief that at this gathering of Military Surgeons from all parts of the country it will be both appropriate and desirable that some account of this school should be given, stating its organization, plans and the work it is doing. The many expressions of interest and approval received from distinguished medical teachers and practitioners must have been very gratifying to the Surgeon General, at whose instance the school was founded. They have certainly been a source of encouragement to the faculty and have been gratefully appreciated. It is not intended to treat the subject exhaustively, for the time that can be allotted to any one paper is short.

It is unnecessary, of course, to point out to this body the need for such a school. We are all proud of the high rank the medical schools of America have taken, of the great improvement that has been made in the courses of study, the extended time now required and the excellent laboratory and clinical advantages now provided; but these schools can not supply the special training the Army Surgeon needs for his work. They have neither time nor facilities for such instruction. The very existence of this society and this gathering together of its members to study subjects pertaining to medico-military affairs proves that special study is necessary. Unfortunately the idea seems to linger in the minds of a few people that all the military surgeon has to do is to sit in his quarters and

wait until somebody gets sick or hurt, that as none but sound men are enlisted there can not be much need for his services, or even that in case of a march or a fight it is only necessary to engage the nearest civilian physician and take him along.

It needs, however, but a little reflection on the part of intelligent men to see that the medical officer has demands upon him other than those of the practitioner settled in a civil community.

He has, in the first place, to make sure by a careful examination that none but sound men are enlisted or commissioned. Then it becomes his duty (and this, though briefly stated, is really his most important work) to watch over the health of the troops and see that no cause interfering with their physical efficiency gains headway. This involves a study of Hygiene in all its various branches, of air and water and their impurities, clothing, food, exercise, barrack and hospital construction, sewerage and drainage, sanitary chemistry and practical bacteriology. He must be acquainted with the diseases specially apt to attack troops or caused by the aggregation of men, and the wounds caused by the weapons used in modern warfare. He must know how to manage a hospital, to command, instruct and discipline his assistants and his Hospital Corps and lastly, but by no means least, he must have an intimate acquaintance with the methods of army business, of regulations, modes of supply, etc., so that he can readily and effectively apply his professional and special knowledge to the varied work committed to him. It is this special training that the young medical officer gets in the Army Medical School.

It is interesting to see how the necessity for an Army Medical School has been recognized for many years and by many nations, by some of those nations even that we are not disposed to look upon as the most progressive. We find that some thirteen nations have schools of instruction for their Army medical officers more or less complete, and that in several more Army Medical Schools have had an existence at different times. There is not time to more than briefly look at the principal schools; but this brief survey will be of interest.

Army Medical Schools group themselves into two general classes. First those in which the pupil or candidate is taken at the

beginning of his medical studies and receives his general professional education as well as his special training for the medical staff under the care of and partly or entirely at the expense of the State. He obtains his civil degrees as Doctor of Medicine during the course which necessarily is an extended one, lasting a number of years. The Army Medical Schools of France, Germany, Russia, Turkey and Mexico are illustrations of this system. All other medical schools, by far the larger number, are practically post-graduate schools; in these the candidates under probation or newly appointed medical officers are already graduates of civil medical colleges and are given instruction in military medicine, surgery and hygiene and in their special duties as medical officers, together with in most cases practical work in military hospitals. The British Medical School is the most important instance of this class. Other less complete schools are those of Sweden, Italy, Spain, Switzerland, Greece, Japan and the United States.

The British Army Medical School is of the most importance for us to study, since the organization and mode of recruiting of its army is most like ours. The necessity of special instruction for Army Surgeons was early recognized in Great Britain and chairs of military surgery were established in the last century in the universities of Edinburgh and Dublin. John Bell, Sir George Ballingall and Dr. Robert Jackson advocated the establishment of an Army Medical School, but it was not until after the need was driven home to the Government by the administrative breakdown of the Crimean war that the school was established. Organized in 1860 at Chatham, it was, in 1863, removed to the Royal Victoria Hospital, Netley. For several years medical officers of the Navy were also instructed at Netley, but for the past few years the Navy has had its own school at Haslar. There are four professors with assistants, giving instructions in Hygiene, Military Medicine, Military Surgery and Pathology, which are taught not only by didactic lectures but by laboratory exercises. Courses on Ophthalmology and Lunacy are also given and the young medical officers are taught practically the examination of recruits and other details of Army medical work. The wards of the Victoria Hospital, which receives patients invalided from India

and the Colonies, give facilities for the study of diseases and injury. Graduates in medicine admitted at a preliminary examination, held twice yearly at London, as surgeons on probation, are sent to the Netley school for a four months' course and afterwards to the camp at Aldershot for instruction in equitation and Hospital Corps drill before being assigned to duty with troops. The rank of the young medical officer upon entering the service is determined by the combination of marks received at the preliminary examination held in London and those given at the final examination concluding the three years' course at Netley. This feature might with propriety be incorporated in our system. The British Medical School has a world-wide reputation from the distinguished lecturers and writers, Aitken, Parkes, Longmore, McLean and others, who have been connected with it.

The arrangements at the Army Medical School on the Continent, where the military services and general conditions are very different from ours, are more difficult to describe, and we can note only the most prominent features.

"Military Hospitals of Instruction" were instituted in France as early as 1836, but it was not until 1852 that the present Chiet Medical School at Val de Grace Hospital, Paris, was established. This institution receives its pupils from two sources, the pupils being chiefly those who have received their medical education and received their doctorate while at the preparatory Army Medical School and Hospital at Lyons. The Lyons school replaced a similar one at Strasburg after the Franco-Prussian war. Soldiers from the line are admitted to this school at Lyons as well as civilian youth. Others are admitted to Val de Grace who had obtained their medical education and degrees at their own expense and who have entered the Army direct from civil life after competitive examination. Provision is also made for the instruction of medical officers already in service as they can be spared from their regular duties, especially after return from service in the Colonies. The administration of the school is under the general charge of a Director, and the teaching staff consists of six professors and eight assistants. The branches taught are very similar to those taken up at the Netley School—Military Hygiene,

Military Medicine and Surgery, didactic and clinical, Diseases of the Eye and Ear, and Skin Diseases; these are taught chiefly clinically. There are also courses in Sanitary Chemistry, Bacteriology, Histological and Pathological Anatomy, Medical and Military Service and Administration; Ambulance Drill and exercises in riding and fencing are also subjects of instruction.

The Military Medical School of the German Empire, training medical officers for both Army and Navy, is in Berlin. Founded at the instance of Surgeon General Goercke in 1795, after some modifications of organization and name, it became, in 1818, the *Medicinisch-Chirurgisches Friedrich-Wilhelms Institute*. The *Medicinisch-Chirurgische Academie fuer Militaer*, founded in 1811, differs only in the pay and allowances for quarters for students and the length of time the students have to serve as medical officers after graduation. The instruction and clinics are the same, being given chiefly by the professors of the University of Berlin staff. There are twenty-six Staff Surgeons on duty as instructors and assistants. The course of instruction extends over four and a half years, taking students through the whole of their medical education. The special medico-military subjects taught do not differ materially from those taught at Netley and Val de Grace—Military Medicine, Surgery and Hygiene, Microscopy, Bacteriology, and instruction in military duties, riding, etc. A peculiar feature of the German school is that every student is required to serve six months in the line, which is taken from the course of study but is not lost, as his physical development, discipline and knowledge of practical military affairs are thereby enhanced. There are now 264 students, 18 belonging to the Navy; 30 entering the school every six months, there being two sessions a year. The laboratories, museum, and libraries are fully equipped and instruction is provided not only for the pupils proper but for medical officers of the Army already in service. Clinical medicine and surgery is taught at the civil and garrison hospitals of Berlin.

The Imperial Russian Army Medical School at St. Petersburg has existed for a number of years. It has two classes of pupils, those educated at public cost and those paying their own expenses. Five

years is the course, two sessions a year, and those educated at public cost must serve a year and a half as medical officers for every year at the school. Commissioned medical officers are also sent to the school for a two years' course. There are some 50 of this class of students. Those officers who take the course must serve a proportionately longer time before they can retire from the Army. The students are quartered at the Military Hospital in St. Petersburg and the courses do not differ materially from those at the other good military medical schools.

Besides the medical schools of the greater nations, there are others in the smaller States. Sweden has had a military medical school at Stockholm since 1877. Its course in 1892 extended from September 15th to December 22d. The course, though a short one, seems to include all the important branches taught in other schools, including clinical work in the garrison hospital and laboratory exercises in chemistry and bacteriology, etc. A somewhat unusual feature of the course was the study of the history of wars, plans of campaigns and practical instruction in the field in location of dressing stations and field hospitals.

The Italian Army Medical School, called School of Application of the Sanitary Service, is situated at Florence, and seems to combine instruction for enlisted men, for candidates for the lower grade of medical officers and special courses for medical officers already in service. It has a Director and Vice-Director, six professors and several assistants. The course is seven months.

The Spanish Military Medical School, established at Madrid in 1886, bears the title "Anatomical, Bacteriological and Pathological Institute." It has a staff of a Director and three other medical officers. Medical officers appointed into the Spanish Army are attached as ward surgeons to the hospital in Madrid, receiving instruction at the same time at the military institute above referred to.

The Swiss Army is in reality a National Guard, each canton furnishing troops for a brief period, in times of peace, for military practice. The medical officers are mostly regimental. The four medical officers of the permanent establishment also form the staff of the Army Medical School at Basle. Each regimental medical offi-

cer is required to attend the school for fourteen days every two years, or, at his option, to serve with the troops during a maneuver season.

Greece gives its army medical officers admitted from civil life after competitive examination, a six months course of instruction at the Military Hospital at Athens, with lectures on the usual special subjects treated at such schools.

The medical officers of the Turkish Army are educated by the Government from an early age, passing through primary and advanced schools before entering the medical schools proper and receiving their degree. They finish their instruction at a Military Hospital. All these schools are in or near Constantinople. The course extends over fifteen years, and the branches are similar to those taught in like schools in other countries.

Medical schools for the military service have existed in Austria and in Holland but are not just now in operation.

Coming over to America, we find that our sister Republic of Mexico has recognized the necessity for special education of her Army Medical Officers and has a hospital of instruction in the City of Mexico, with a Director and a staff of five professors and four other assistants and twelve students. The students while being trained in the Hospital take a concurrent course in medicine at the National Medical College, being commissioned after receiving their degree. Other medical officers enter the service direct from civil life.

Even Japan has its Army Medical School, and, to judge from its organization and curriculum, an excellent one. There are a president, five professors and three assistant professors; also a professor of languages, English, French and German. Military Medicine, Military Surgery and Military Hygiene, Military Laws and Regulations and Pharmacy are taught. The students, already graduates in medicine, are required to take two courses in the Army Medical School and pass a satisfactory examination before being commissioned medical officers in the Army. Japan appropriates \$5000 annually in addition to salaries for the expense of its Army Medical School.

This brief glance at the Army Medical Schools of other coun-

tries may well excite surprise that we have been so late in establishing our own, which dates from 1893.

It should be noted, however, that the Medical School of the United States Army, established in this city last year by order of the Secretary of War at the instance of Surgeon General Sternberg, was not the first one that had been proposed in this country, though the first to be established and to go into operation. Professor J. H. Brinton, of Jefferson Medical College, formerly Surgeon of Volunteers and on duty in Washington from June, 1862, to September, 1864, informs me that early in 1863 he was ordered by Surgeon General Hammond to prepare for the opening of an Army Medical School. Surgeon Brinton, who will always be remembered as the first curator of the Army Medical Museum, which has to-day, under the superintendence of Doctor Billings, and the financial help of Congress, reached such large proportions, had his collection in the Cercoran School House on H Street, between 13th and 14th Streets, which had been taken possession of by the Government for the purpose. Under the direction of General Hammond Dr. Brinton proceeded to fit up the main room for a lecture room, and had a revolving table, anatomical and surgical charts and other appliances prepared. The scheme had even gone so far that the chairs, and the teachers to fill them, were under consideration. Among these were Surgeons Coolidge, Vollum and Lidell and Assistant Surgeons Woodward and Thomson and others. The students were to be medical cadets and the younger medical officers, of whom there was of course a considerable number in and around the city. Surgeon Brinton had, he informs me, prepared his opening address, but the plan failed at the last moment to receive the sanction of the War Department and never went into actual operation.

As stated, the U. S. Army Medical School was established in June, 1893, by order of the Secretary of War, and it began its first session of four months November 1, 1893. It is designed for post graduate instruction only, and intended chiefly for the benefit of the candidates who have passed the examination held just previous to the opening of the school session and been commissioned assistant surgeons. Assistant surgeons of longer standing and service

are also admitted if stationed sufficiently near Washington to attend or who desire to devote a leave of absence to this instruction. Five newly commissioned and four assistant surgeons of older date were in attendance during the session of 1893-94. The organization and regulations of the school are given somewhat in detail in the appendix to this paper. As seen, the faculty consists of four professors, those of Military Surgery, Military Hygiene, Military Medicine and Clinical and Sanitary Microscopy, and a President, who also lectures on the duties of the medical officer. There are two laboratory courses, Chemical and Pathological, laboratory work being made a prominent feature of the course and consuming most of the students' time. Instruction in litter and ambulance drill and first aid and in equitation is also included.

The sessions of the school are held at the Army Medical Museum, corner 7th and B Streets, S. W., convenient rooms having been assigned it in this building. These consist of a lecture room, faculty room, special library, chemical and pathological laboratories. Litter drill is taught at the Post Hospital at Washington Barracks, and riding at Fort Myer, Va., through the kindness of the commanding officer, General Guy V. Henry. The appended schedule shows the order of daily duties, from which it is apparent that the student officer's time is very fully occupied.

But some more detailed account of the subjects taught at the school will be desired.

In the department of Military Surgery the professor took up the contrast between ancient and modern conditions, and then modern weapons and missiles, the wounds they produce in different parts of the body, the treatment they demand under the peculiar conditions imposed by the exigencies of the battlefield and the march and as influenced by the germ theory; the arrangements necessary for the prompt relief of the wounded on the field and their transportation, and finally the organization of the military hospital.

The Professor of Military Hygiene, after an historical survey of his subject, took up the influences that affect the health of the soldier, treating of pure air and how to secure it, of water and its impurities and the dangers of disease therefrom, of drainage and

sewage disposal, of healthy sites for and sanitary construction of barracks and hospitals, of food, clothing, and exercise, of sanitary jurisprudence and quarantine, and of vital statistics and death rates as indications of the health of a command. The valuable collections included in the Army Medical Museum and Library were described, with suggestions as to best use of latter—a most important matter.

The Department of Military Medicine treated of the diseases most apt to affect troops under the varying conditions to which they are exposed, when massed together in barracks or camp, on the march, in malarial regions or under extreme climatic conditions. The causes, symptoms and treatment, and mode of promotion of the more important diseases were pointed out.

The instruction given by the lecturer on the duties of the medical officer was in a measure complementary to that in other departments, inasmuch as it gave the young medical officer such knowledge of and familiarity with official forms and methods of doing business in the Army as would enable him to apply his strictly professional knowledge to the best advantage and with the least friction with the duties and rights of others. It was intended to save him months of disagreeable breaking in to Army ways and spare him the mortification of many blunders. Military administration is, we know, a highly organized and nicely adjusted machine and special knowledge is necessary to its effective working. In this department the student officer was in the first place taught the necessity for and the requirements of military discipline and subordination as the foundation of his efficiency and success, and his relations to the commanding and other officers. He was taught both theoretically and practically how to examine recruits, how to examine into and report upon the sanitary condition of his post or camp; how to conduct sick call; how to make out certificates for discharge, especially in reference to the question of pension; how to care and account for public property; how to govern, provide for and instruct the men of the Hospital Corps detachment under his immediate command, with many other matters that need not be enumerated. The instruction given was distinctly practical and included the making out of many papers.

The Laboratory courses, from their practical character and the

considerable time given to each, as we shall see, were of special prominence and importance.

The course in Sanitary Chemistry, after preliminary work necessary to familiarize the students with principles and methods, took up the detection of poisons, such as arsenic in organic mixtures, wall papers, etc.; of antimony, mercury and lead; the analysis of the fluids of the body; the chemical examination of the air and results of ventilation; the study of water and its impurities and their detection; the purity of articles of food, such as milk, butter, cheese, flour, baking powder, etc., and the study of important toxic animal and vegetable products.

The instruction in the Department of Clinical and Sanitary Microscopy was entirely by laboratory demonstration and work. Here the student officer was made to become familiar with the use of the microscope in its important applications to histological, pathological and diagnostic work and the technique necessary for the study of diseased tissues and of pathogenic organisms. A systematic study of the more important bacteria followed, such as the bacilli of anthrax, of typhoid fever, of tuberculosis, of diphtheria and of the spirillum of Asiatic cholera. In each case the forms and conditions of growth of these bacteria were carefully studied with a view not only to their recognition but to an understanding of the best methods of excluding them or arresting their production. Inflammation was studied under the microscope as it actually occurs in various tissues when artificially produced; then the microscopical appearances as they occur in various diseases and in various organs.

The instructor in Hospital Corps drill gave the student officers important practical lessons in first aid to the sick and wounded in emergencies and on the battlefield, such as arrest of hemorrhage, application of splints, etc., and in the careful handling of patients in the litter and ambulance drill. The students were required not only to do these things themselves, but practiced in giving direction to the men of the Hospital Corps in the performance of this work.

The school has been favored with several short courses of lectures by gentlemen not officially connected with it, which have been of great interest and value to the class:

On Military Law, by Major G. B. Davis, Judge Advocate, U. S. Army.

On Comparative Anatomy, by Captain J. C. Merrill, Medical Department, U. S. Army.

On Medical Jurisprudence, by Dr. Robert Fletcher, F. R. C. S.

On Parasites of Man, by Dr. C. W. Stiles, of the Agricultural Department.

Prof. W. W. Keen, of Jefferson College, Philadelphia, delivered a most interesting and instructive lecture before the class on "Recent Advances in the Surgery of the Head."

At the closing exercises of the school, held March 28, 1894, an admirable address on the Army Surgeon was delivered to the graduates by Professor William Osler, of Johns Hopkins University, Baltimore, Md. At these closing exercises a large assemblage of distinguished officers and civilians was present, and the Major General Commanding gave the class a few happily chosen words of advice.

This account of the course of instruction at the first session of the Army Medical School is not at all intended to imply that the course is a perfect or a settled one. It is fully believed that the experience gained will result in perfecting and extending the curriculum. Ways are already seen in which this seems practicable.

No account of Government medical instruction in this country would be complete without mention of the admirable department of instruction established at the U. S. Naval Laboratory, Brooklyn, N. Y., shortly before the establishment of the Army Medical School. Surgeon General Tryon, of the U. S. Navy, is the author of the scheme, which was put into effect by order of the Secretary of the Navy. The instruction in this institution is chiefly by laboratory exercises in chemistry, microscopy, pathology and bacteriology and clinical work in the wards of the Naval Hospital in which the student resides. The official duties of the Naval officer afloat and ashore are also taught. Each newly appointed Naval medical officer is sent to this school before being ordered to his first duty.

The wish and hope has no doubt occurred to many of my hearers who have considered this subject, that some day there will be established in this country a National Medical School for all the services,

accessible to all medical officers of the National Guard. Such a school, uniting the scattered resources of all branches of the service, liberally provided for as it should be by the General Government, would be a most potent factor for good in advancing the great cause of preventive and curative medicine, as well as securing the economical and effective administration of the services themselves. But for this we must wait.

APPENDIX.

GENERAL ORDERS, }	HEADQUARTERS OF THE ARMY.
No. 78. }	ADJUTANT GENERAL'S OFFICE,
	Washington, September 22, 1893.

By direction of the Secretary of War, upon the recommendation of the Surgeon General of the Army, the faculty of the Army Medical School, established by General Orders, No. 51, June 24, 1893, from this office, and regulations for the government of the school, are announced as follows:

FACULTY OF THE ARMY MEDICAL SCHOOL.

Colonel *Charles H. Alden*, assistant surgeon general, U. S. Army, president of the faculty, and lecturer on the duties of medical officers.

Lieutenant Colonel *William H. Forwood*, deputy surgeon general, U. S. Army, professor of military surgery.

Major *John S. Billings*, surgeon, U. S. Army, professor of military hygiene.

Major *Charles Smart*, surgeon, U. S. Army, professor of military medicine and director of the chemical laboratory.

Captain *Walter Reed*, assistant surgeon, U. S. Army, professor of clinical and sanitary microscopy and director of the pathological laboratory.

Captain *Julian M. Cabell*, assistant surgeon, U. S. Army, assistant to professor of military surgery and instructor in Hospital Corps drill.

THE COURSE OF INSTRUCTION.

"The course of instruction will be for four months, and will be given annually at the Army Medical Museum, in Washington City, commencing on the 1st day of November." It will include lectures on and practical instruction in—

1. The duties of medical officers in war and peace.
2. Military surgery, the care of the wounded in time of war, and hospital administration.
3. Military hygiene.
4. Military medicine.
5. Microscopy, sanitary and clinical; pathological histology, bacteriology, and urinalogy.
6. Hospital Corps drill, and first aid to wounded.

By permission of the Surgeon General, medical officers of the Army who desire to avail themselves of the course of instruction, and who are stationed in or near the city of Washington or who have a leave of absence which enables them to attend the course, may be admitted as pupils under the same regulations as apply to recently "approved candidates for admission to the Medical Corps of the Army."

EXAMINATIONS.

At the termination of the course of instruction the "approved candidates for admission to the Medical Corps of the Army" will be examined by the several professors, and their relative proficiency in each branch will be reported by the president of the faculty to the Secretary of War through the Surgeon General of the Army.

REGULATIONS.

1. The president of the faculty will be responsible for the discipline of the school.

2. The junior professor will act as secretary and will be responsible for all property pertaining to the school.

3. A faculty meeting will be held in the office of the secretary on the first Monday of each month from October to March, inclusive, and whenever called by the president of the faculty or the Surgeon General of the Army.

4. Resolutions adopted by the faculty relating to the course of instruction, the purchase of books and instruments, &c., will be submitted to the Surgeon General of the Army for his approval.

5. The president of the faculty will submit to the Surgeon General of the Army, on or before the 1st day of April of each year, a detailed report of the condition of the Army Medical School, including an account of the instruction given and the proficiency of the several pupils as shown by an examination made by each professor at the termination of his course.

6. The hours of instruction will be from 9 to 12 a. m., and from 1 to 4 p. m., daily, from November 1 to February 28, inclusive, with the exception of Saturdays, Sundays, legal holidays, and the week commencing December 25.

7. Pupils will be required to be present during the hours designated unless specially excused by the president of the faculty or by orders from the War Department.

8. When necessarily absent on account of sickness or other emergency, pupils will, as soon as practicable, send a written statement to the secretary of the faculty, explaining the reason for such absence.

9. The laboratories and library of the Army Medical School will be open for the use of pupils during the hours of instruction designated.

10. Pupils will be held strictly accountable for all instruments and apparatus issued to them for their personal use during the course of instruction, and for any loss or injury to books or apparatus belonging to the Army Medical School, when such loss or injury is due to carelessness or neglect.

11. Pupils in the Army Medical School, during the hours of instruction, will wear the undress uniform of the grade to which they belong, except when

engaged in laboratory work, when a black cambric laboratory gown may be worn.

BY COMMAND OF MAJOR GENERAL SCHOFIELD:

R. WILLIAMS,
Adjutant General.

OFFICIAL:

Assistant Adjutant General.

ARMY MEDICAL SCHOOL,
WASHINGTON, D. C.

Session of 1893-'94.

ORDER OF DUTIES.

Daily, except Saturdays, Sundays, and holidays:

- 9 a. m. to 12 m Instruction in Pathological Laboratory.
- 1 p. m. to 2.50 p. m.....Instruction in Chemical Laboratory.
- 3 p. m. to 4 p. m.....Lecture.

Saturdays:

- 9.30 a. m. to 10.30 a. m., at Hospital Corps School of Instruction, Washington Barracks....Practical Instruction in Litter and Ambulance Drill and First Aid.
- 11 a. m. to 12 m., in Riding Hall, Fort Myer, Va....Practical Instruction in Equitation.

The lectures will be delivered as follows:

- Duties of Medical Officers.....Wednesdays.
- Military Surgery, &c.....Thursdays.
- Military Hygiene Fridays.
- Military Medicine.....Mondays or Tuesdays.

AUXILIARY COURSES—Mondays or Tuesdays.

- Bacteriology General Sternberg.
- Military Law.....Major G. B. Davis, Judge Advocate, U. S. A.
- Comparative Anatomy, &c.....Captain J. C. Merrill, Med. Dept. U. S. A.
- Medical Jurisprudence.....Dr. Robert Fletcher, F. R. C. S. Eng.
- Parasites in Man Prof. C. W. Stiles, M. D., Department of Agriculture.

WALTER REED,

**Capt. and Asst. Surg. U. S. A., Secretary of the Faculty.*

*Since promoted Major and Surgeon.

WEAPONS OF WAR. ILLUSTRATED WITH EXAMPLES OF MODERN SMALL ARMS, PROJECTILES, AND SMOKELESS POWDERS.

BY LIEUTENANT-COLONEL WILLIAM H. FORWOOD,

Deputy Surgeon-General U. S. A., Washington, D. C.

I shall not detain the Association with any extended remarks on the subject of military weapons in general, but shall simply refer to a few points of interest in connection with the evolution of the modern rifle and the new smokeless powders.

I am indebted to the Ordnance Department for the loan of these guns which include one of the new magazine rifles now being manufactured at Springfield, Mass., and with which our infantry regiments are soon to be armed. We have here also the old 45-caliber rifle, now in service and these beautiful specimens of the new and old powders.

The evolution of the modern rifle is marked by three well defined periods or stages of advancements. The first extends from the introduction of firearms into warfare down to about the middle of the present century and is characterized by smooth bore, muzzle loading guns of all kinds and round bullets. The second period begins with the Crimean war and extends to 1886 during which the lead bullet was elongated, the barrel of the gun rifled and the breech-loading method introduced. The third period, from 1886 to date, is marked by the perfection of the new steel cased bullet, the new smokeless powders and this (exhibiting) new and wonderfully destructive engine of war—the modern small caliber magazine rifle.

The rifle is the most important military weapon so far as the surgeon is concerned, since it causes about 90 per cent of all gunshot wounds in battle. It has come down to our time like the steam engine and the printing press, through a long process of evolution from rude beginnings to its present perfected form. Its original prototype was the old hand cannon, a roughly constructed tube of

metal supported at one end on a forked stick and fired by means of a slow match of ignited tow held in the hand. This was followed in the latter part of the 14th century by the arquebus which at first had a straight stock and was fired from the breast. The Germans gave an angle to the butt end so as to bring it to the shoulder. The slow match tow was carried by the soldier in a long cord wound around his waist. Then came the matchlock having a trigger and a bent iron lever in the end of which the match was fixed and brought down on the powder in the pan, the lid of which was raised by hand. The difficulties encountered in the use of this weapon from wind and rain which extinguished the match and blew away the powder, were obviated to some extent by the wheel-lock introduced in 1517, which produced a spark by friction between a piece of flint or iron pyrites and a toothed wheel and opened the pan at the same movement. About the middle of the 17th century the flintlock was devised and adopted over all other methods for firing small arms and for 150 years, including the entire 18th century, the soldiery of all nations were armed with flintlock guns.

The percussion cap was patented in England in 1807, but its general introduction was long delayed, and it was not adopted by the United States government until as late as 1840. Up to that time all military firearms were of the large caliber, smooth-bore, muzzle-loading kind, using 60-80 grains of loose black powder, and one or more round bullets. The caliber of the infantry musket was nearly three-fourths of an inch in diameter, and the projectile had an initial velocity of only 600 to 800 feet per second and an effective range of not to exceed 200 yards.

At the opening of the Crimean war in 1854, the celebrated Minie rifle made its appearance, the first successful attempt at rifling the barrel and elongating the projectile, which has since resulted in such a wonderful revolution in military weapons and in the character of wounds presented to the military surgeon. Only a portion of the allied forces were armed with this new weapon, the Russian troops still having the old smooth-bore guns. The English and French surgeons, therefore, saw only the wounds with which they were familiar in former wars, but the Russian surgeons, among whom was

Pirogoff, were confronted with many bullet injuries which to them were of a new and peculiar character—the first indication of that explosive effect on the tissues which, though no explanation of it was attempted at that time, became so important a factor in the gunshot wounds of later wars.

The success attained in elongating the bullet and rifling the barrel thus demonstrated in the Minie rifle was soon followed by other guns of similar construction. The war of the Rebellion was fought for the most part with large caliber muzzle-loading rifles, using paper shell cartridges which the soldier had to bite off before ramming down the charge. Recruits in those days were always examined to see if they had front teeth suitable for tearing the tough cartridge paper.

During the war with Denmark, in 1864, the Prussian needle gun suddenly came into prominence and astonished the military world as the first successful breech-loader. The vast importance of this improvement was at once appreciated by other nations and, "the forges all over Europe were at once set in active operation manufacturing new guns and altering old ones into breech-loading rifles." Many improvements were made and many famous guns produced, among which were the English converted Enfield in 1865 and the Martini-Henry in 1869, and the French Chassepot. The bore of the gun was steadily reduced and the velocities of the projectiles, the effective range and the accuracy of aim, were markedly increased. The old smooth-bore calibers of from .60 to .70 were reduced to .58 in the Minie rifle and the Prussian needle gun and in the Chassepot, the bore was less than 44 one-hundredths of an inch in diameter, while the bullet had an initial velocity of 1,650 feet per second. The Chassepot was then regarded as a phenomenal weapon and its performance in the Franco-German war proved it to be far superior to the improved needle gun or to any small arm which up to that time had been produced. In 1875 the Springfield breech-loading rifle with a caliber of .45 was adopted by the United States. Metallic case cartridges, being an essential part of the breech-loading mechanism, were developed simultaneously with it. The character of wounds made by these improved rifle projectiles with their high

velocities, crushing effects on the long bones and mangling of the soft tissues, are well known to military surgeons.

Great as the improvements in small arms up to this time had been it was well known that still higher velocities, longer range and greater accuracy of aim were to be attained by a still further reduction in the caliber of the gun. But against this advancement a most serious practical difficulty now arose. The soft lead of which the bullet was composed would admit of no further reduction in diameter because this necessitated an increase in the rotary motion on its long axis to give it steadiness in its flight. That motion could only be imparted to it by increasing the spiral turns in the rifling of the barrel. But when the grooves took more than about one spiral turn in the ordinary length of a rifle the lead refused to follow them but stripped off and went straight across the lands. The old lead bullet with which the vast majority of all gunshot wounds have been made in all the wars for centuries past had therefore to be laid aside and some new material sought to meet the demands of modern military science. At first it was proposed to use a simple bolt of polished steel, but this proved to be too light. Then a slug of lead hardened by from 5 to 10 per cent of antimony was prepared and forced into a thin casing of harder metal. This did well, the only difficulty being to find the best material for the outer casing. Copper, German-silver, spring steel plate, copper-nickel, and cupro-nickel steel were experimentally tested all of which proved to be more or less suitable, the superiority being much in favor of the latter.

A bullet was thus constructed which, by making it the tenth of a millimeter larger than the bore, would follow the rifle grooves even with three full turns in the length of the barrel and with a caliber of .30 or less. So far success was complete. The velocity, range and accuracy of the new missile surpassed any that had ever before been attained. But now a new difficulty was presented, which at first appeared to be unsurmountable. The old black powder which had been used as the propulsive agent in all firearms from time immemorial failed to fulfill the requirements of the new rifle. The residue left from its combustion soon clogged up the grooves in the small bore and it was found that after firing half a dozen rounds the

weapon became disabled and had to be cleaned. Military men were compelled therefore to retain the .43-.45 caliber rifles and to abandon temporarily any further attempt to improve the efficiency of these weapons by reduction of caliber.

This set back in the evolution of the rifle was followed by an interval of nearly fifteen years during which inventors and manufacturers were busily engaged in experimenting to find some explosive agent which would fulfill the purposes of ordinary gun powder and yet burn with little or no residue. The first practical success in this direction was accomplished by France in 1886, when she produced the famous Lebel rifle which then came suddenly before the world almost perfect as a specimen of the present modern small caliber rifle and necessitated the immediate re-armament of every European power. The Lebel had a caliber of 8 mm. with a cylindro-oval nickel-steel cased bullet $1/10$ mm. larger and about four calibers long, weighing 230 grains which with 36 grains of smokeless powder attained an initial velocity of 2,000 feet per second and an effective range of nearly two miles. In the numerous noted rifles of this class that have since been produced, such as the Mannlicher, Mauser, Berthier, Lee-Speed, and others, many improvements in the smaller details have been made but they are all strikingly similar and differ but little from the original model as may be seen from the chart on the wall. Our own government has been somewhat slow to adopt the new weapon but by waiting we have lost nothing and gained many advantages from the experience of other nations. Our new magazine rifle model of 1892 as it is officially called may be regarded as the most perfect representative of its class yet produced. It is a five-cartridge, cut-off, magazine rifle, 30 in. barrel, caliber .30, weight 8 lbs. 7 oz. The bullet is a slug of lead hardened by 10 per cent of antimony and covered by a cupro-nickel steel casing, is 1.25 in. long and weighs 220 grains. With 37 grains of Wettern smokeless powder, the projectile will have an initial velocity of 2,000 f. s. and a rotary motion on its long axis of 2,400 revolutions per second, or one turn in ten inches. The important changes in the character of gunshot wounds made with these missiles is a subject of experiment and study at the present time

with considerable literature and data already accumulated and now being actively discussed.

In regard to the new smokeless powders, a great variety of which are here exhibited, it may be said that while the details of their preparation are more or less strictly guarded as national or trade secrets, it is shown by analysis that their composition is based upon a substance resulting from the action of nitric acid on vegetable fibre in the form of binitrate or trinitrate of cellulose. The object in constructing these powders is not to avoid smoke for any tactical purpose but to avoid residue in the barrel of the gun. They burn with but little residue and they are therefore relatively smokeless.

The ballistic data of all the more noted modern rifles now adopted by foreign powers are fully exhibited in the chart which will be left on the board for inspection.

[Discussion on Col. Forwood's Paper.]

Dr. Beyer:—What is considered the limit in this reduction of the calibre of the bullet?

Col. Forwood:—Limit in what direction?

Dr. Beyer:—The calibre of that projectile.

Col. Forwood:—It is limited by the physical difficulties which you encounter in giving it a rotary motion on its axis. It has been successfully rotated as low as a 25 calibre, which is one-quarter of an inch.

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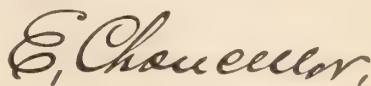
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SELECTED PRESCRIPTIONS

In Threatened Abortion and Ovarian Neuralgia.

R Antikamnia (Genuine).....gr. vj
Fild Ext Viburnum Prun... 3 j
Morphia Sulph.....gr. l-8
M. Sig.—Repeat in three or four hours.—Miss. Med. Monthly.

Chronic Rheumatism and Neuralgia.

R Antikamnia (Genuine).
Cinchon d Salicyl.....aa 3 j
M. ft. Cap. No. xx.
Sig.—Take four a day.
Leonard's Illustrated Med. Journal.

Tonic in Painful Atonic Dyspepsia.

R Antikamnia (Genuine).... 3 iss
Tinct. Nux. Vom..... 3 j
Tinct. Gentian Co..... 3 ij
Syr. Sarsap. Co.....ad 3 iv
M. Sig.—Teaspoonful after meals.
—Medical Summary.

Sedative Powder, especially for Painful Menstruation.

R Antikamnia (Genuine)..... 3 j
Dover's Powder.....gr. xx
M.—Make capsules No. xij.
Sig.—Two once in two hours, until easy.—Medical Bulletin.

In Grip, Neuralgia, Rheumatism.

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Sulph. Quinia.....gr. ij
Sulph. Morph.....gr. l-8
M. ft. Chart No. I, as required.—
The Southern Practitioner.

Painful Dysmenorrhœa.

R Antikamnia (Genuine).... 3 j
Brom. Potass..... 3 ij
Elix. Simplex..... 3 ij
M. Sig.—Teaspoonful every hour in water.—The Courier of Medicine.

Treatment of Colds.

R Antikamnia (Genuine).
Salol.
Sulph. Quinia.
Terpin. Hydrate....aa grs. xxiv
M. ft. Capsules xii. One every four hours.—Virginia Med. Monthly.

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Atropia Sulph.....gr. l-200
M. Sig.—Give at one dose, repeating if necessary.—Medical Era.

Muscular Soreness, Lagrippe Pains.

R Antikamnia (Genuine).
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Pulv. Ipecac et Opii.....grs. x
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—Buffalo Med. and Surg. Jour.

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—Times and Register.

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—Am. Gynecol. Jour.

Pain in Grip, Influenza, etc.

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Salol..... 3 ss
Quinia Sulph.....grs. xxiv
Spts. Vin Gall..... 3 ij
M. Sig.—Teaspoonful every two hours.—Maryland Med. Journal.

Bronchitis.

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Liquor Ammon. Acet..... 3 iss
Mist. Glycyrrh. Comp..... 3 ij
F. E. Rad. Glycyrrh.....ad 3 vj
M. Sig.—Two teaspoonfuls every three hours.—New Eng. Med. Month.

Hysteria.

R Antikamnia (Genuine).... 3 iv
Alcohol..... 3 j
Elix. Ammon. Valerian, ad 3 vj
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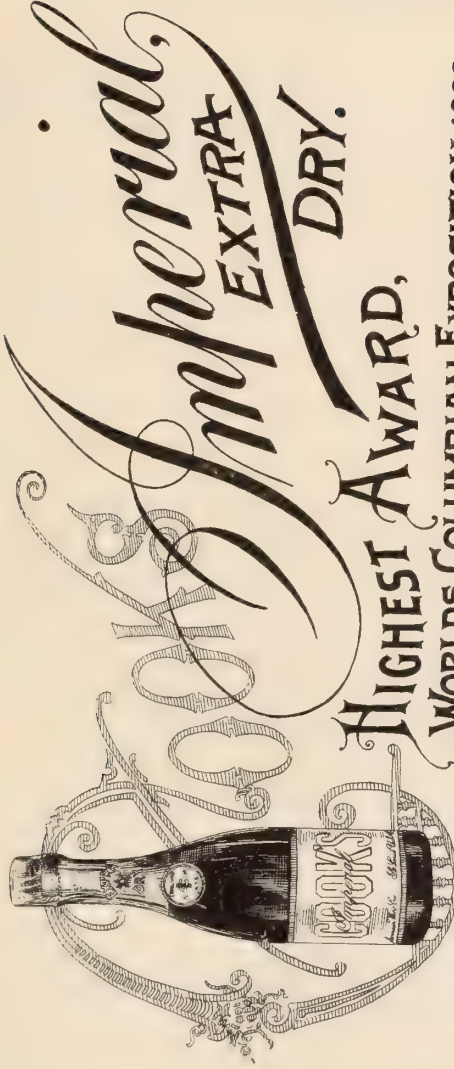
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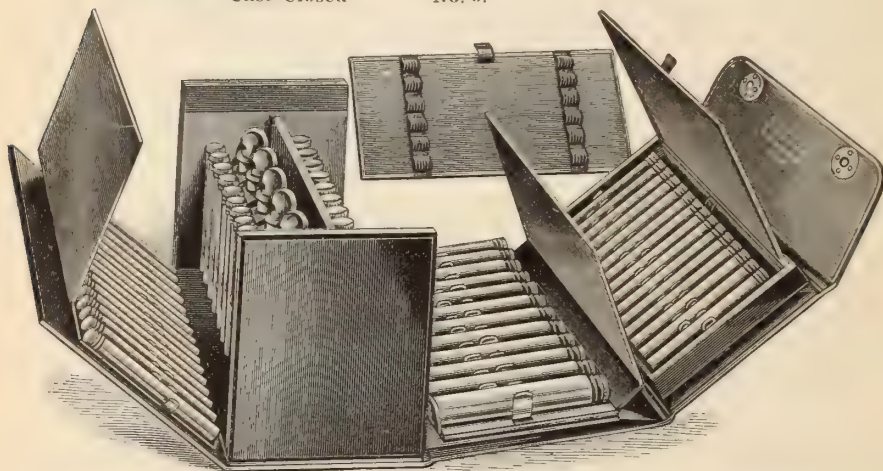
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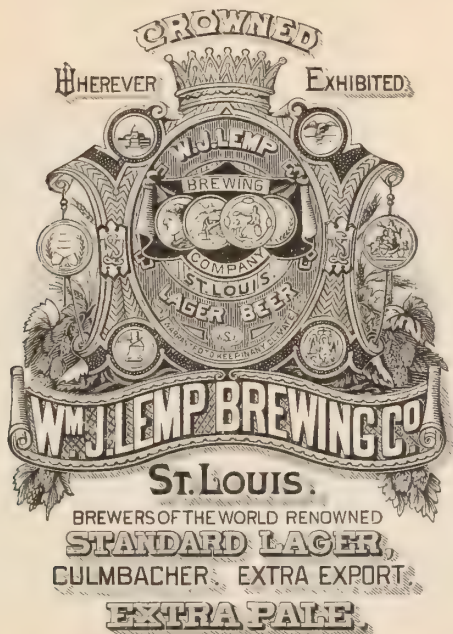
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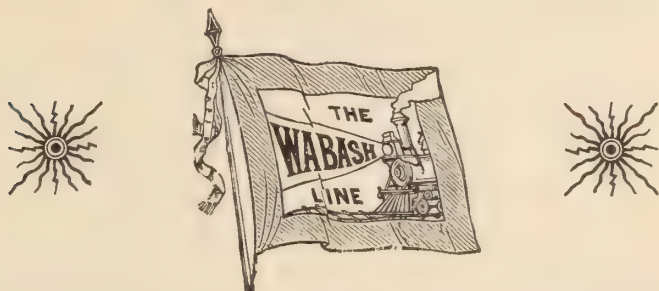
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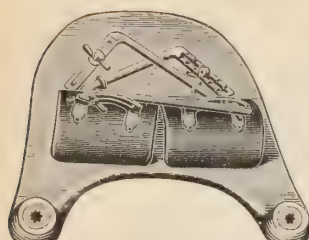
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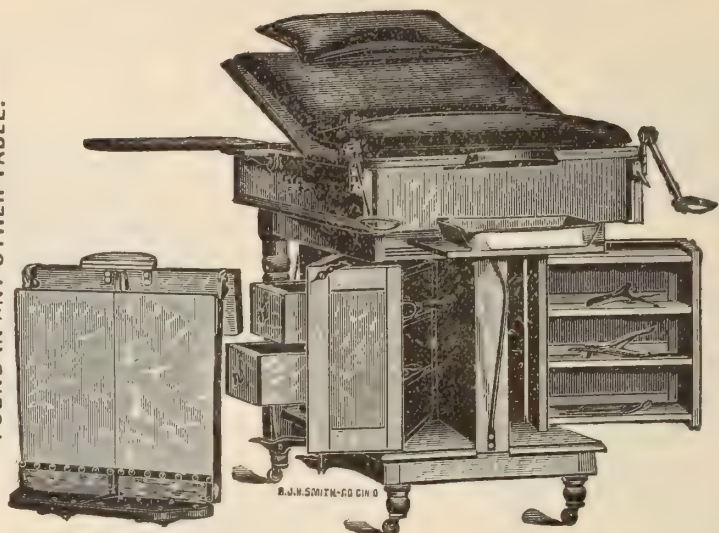
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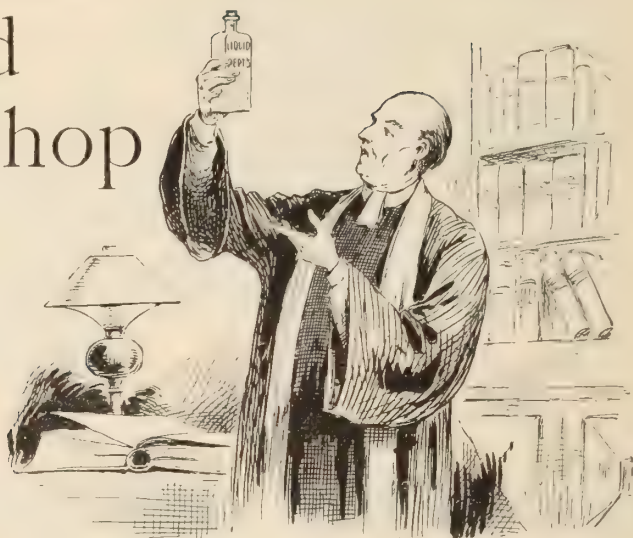
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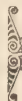
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Sodium Carbonate 63.543	Potassium Sulph. . . . 370
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Ferrous Carbonate . . . 526	Bromide of Lithia . . 2.256
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